Advanced Server UNIX V4.0

Overview and Installation

Comments… Suggestions… Corrections…

The User Documentation Department would like to know your opinion on this manual. Your feedback helps us to optimize our documentation to suit your individual needs.

Fax forms for sending us your comments are included at the back of the manual.

There you will also find the addresses of the relevant User Documentation Department.

Copyright and Trademarks

This manual is printed
on paper treated with
chlorine-free bleach.

1 Preface

Advanced Server for UNIX can be used to integrate personal computers, which are operated under MS-DOS® (also running MS Windows or MS Windows for Workgroups), MS® OS/2 or OS/2® (referred to as OS/2 in this manual), Windows 95/98 and MS Windows NT® operating systems, in local networks (LAN, **L**ocal **A**rea **N**etwork and WAN, **W**ide **A**rea **N**etwork). Advanced Server for UNIX allows the operation of various systems in a network.

Advanced Server for UNIX V4.0 (Advanced Server for UNIX in this manual) provides users with server functions for the local network. It extends UNIX® to a network operating system. Advanced Server for UNIX corresponds to Windows NT Server. The network server is based on systems with the operating system UNIX. Cooperation with Microsoft® has ensured that Advanced Server for UNIX is compatible with Windows NT Server.

> **i** The operating system is generally referred to as UNIX in this manual. This term is used generically to include all UNIX operating systems on which Advanced Server for UNIX is installed, for example Reliant UNIX.
>
> Advanced Server for UNIX is also used in abbreviated form as AS/X, as well as sometimes as AS/U or Advanced Server. All of these terms are synonymous for the same product.

The description of the entire Advanced Server for UNIX product covers several manuals. The "Concepts and Planning" manual provides information on the structure and functionality of Advanced Server for UNIX and describes, among other things, the differences in comparison to LAN Manager/X.

This manual provides information on the enhancements that are implemented in Advanced Server for UNIX; it supplements the information in the manual entitled "Concepts and Planning". The installation and configuration of Advanced Server for UNIX on the UNIX system are also described in that manual.

The "API Reference" manual contains information on the API (Application Programming Interface) with regard to syntax and functions. It is supplemented by online documentation which is supplied with the package for the manual pages.

The "SNMP Service" manual contains information on the installation and configuration of an extension for the SNMP agent (Simple Network Management Protocol), which among other things allows network events to be determined centrally. This manual is part of the LAN Manager/X V2.2 series of manuals.

The "User's Guide for MS-DOS Clients" and "User's Guide for MS Windows Clients" are aimed at users of the MS-DOS or Windows clients. They provide information on starting up and closing down clients, and on shared directories and printers. They also provide references to the commands available for working with the client. The manuals "Installation Guide for Clients", "MS Network Client V2.2", and "MS Network Client V3.0" describe how to install these clients.

The manual "NetWare Connectivity" contains information on how your MS-DOS client can work simultaneously with Advanced Server for UNIX or LAN Manager servers and with NetWare® servers. It also contains installation and configuration instructions for NetWare Connectivity.

1.1 Target group

This manual is intended for the system and network administrator, who is responsible for installing, configuring, and operating Advanced Server for UNIX.

The network administrator is known as the **administrator** in this manual.

$\boxed{\mathbf{i}}$

- The administrator requires the **rights of the system administrator** *root* and must have an in-depth knowledge of the operating system and of the Advanced Server for UNIX product. The tasks of the administrator and the system administrator are undertaken by **one** person.

- In order to execute administrator commands using the *net* commands, you simply need to log on with *net logon Administrator <password>*.

1.2 Summary of contents

> **i** Information that became available after this manual went to print is contained in the
> *SIreadmeM* package which is supplied with Advanced Server for UNIX.

The chapter "Preface" provides users with an overview of the content and structure of this
manual.

The chapter "Introduction to Advanced Server for UNIX" contains information on the supple-
ments and changes which you will require in addition to the information contained in the
"Concepts and Planning" manual.

The chapter "Advanced Server for UNIX architecture" contains an overview of the process
model and of internal and external Advanced Server for UNIX communication.

The chapter "Installing Advanced Server for UNIX" contains information on the hardware
and software requirements of your server system. It also provides instructions for trans-
ferring the Advanced Server for UNIX software onto the server system as well as all the
information required to configure the system and Advanced Server for UNIX software, and
to create a development environment for Advanced Server for UNIX applications.

The chapter "Configuring Advanced Server for UNIX" contains, among other things, the
steps necessary for configuring and for starting NetBIOS and Advanced Server for UNIX.

You should consult the chapter "Administration guidelines" if you want to change the role of
the server, for example if you have installed and configured Advanced Server for UNIX.
Among other things, the chapter also describes how to enable a CD-ROM drive for
Advanced Server for UNIX.

The chapter "Tools for special tasks" describes other tools offered by Advanced Server for
UNIX. These are generally only relevant when used with particular applications.

Another chapter is dedicated to "Installing Network and Administrative Client Software".

The next chapter is about "Administering Advanced Server at the Command Prompt".

Then a chapter describes in detail the WINS service: "Implementing WINS".

The chapter entitled "Troubleshooting" contains guidelines for resolving errors.

The chapter "Advanced Server for UNIX - directories and files" contains an overview of the
most important files and directories of Advanced Server for UNIX.

The following chapters describe in detail "Advanced Server Registry" and the "Lanman.ini
File".

The "Glossary", "Abbreviations", and "Index" chapters are useful as a reference when
reading this manual.

The "Related publications" chapter lists additional useful documentation.

1.3   Changes since the last version of the manual

The documentation has been updated to conform to the software level of Advanced Server for UNIX V4.0B.

For a list of differences between Advanced Server for UNIX V4.0B and the previons version, please refer to the section "Compatibility" in the chapter "Introduction to Advanced Server for UNIX".

1.4   Notational conventions

The following notational conventions are used in this manual:

Convention	Usage
Italics	in the main body of text denote file, variable, and program names, as well as commands and options in continuous text
Bordered Courier	indicates extracts from files
Courier	denotes system output
Courier semi-bold	denotes user input in a sample dialog
Key	indicates a key or key combination
►	indicates tasks to be performed by the user
i	denotes important information that must be heeded
⚠	denotes a warning that you must heed to avoid loss of data or serious errors

2 Introduction to Advanced Server for UNIX

This chapter contains supplementary and additional information on Advanced Server for UNIX that is not contained in the manual entitled "Concepts and Planning".

The following topics are dealt with:

- Shared resources and services
- Connection management
- Administration
- Application Programming Interface (API)

The section on "Client-server architecture" contains a short description of the client-server architecture. The section entitled "Shared resources" contains information on which network resources of Advanced Server for UNIX can be shared.

The section entitled "Services" introduces the services provided by Advanced Server for UNIX. The section "Connection management" explains the terms "sessions" as well as "connection". This section also provides information on the security concept of Advanced Server for UNIX. The manual entitled "Concepts and Planning" contains conceptional information relating to this topic.

Finally, the section "Administration of Advanced Server for UNIX" provides information on remote administration.

Information on the programming interface and on compatibility can be found at the end of this chapter.

2.1 Client-server architecture

One or more server systems and several clients (workstations) are connected in a network (LAN, **L**ocal **A**rea **N**etwork and WAN, **W**ide **A**rea **N**etwork) with Advanced Server for UNIX. The server systems **provide** services and resources in the local network. In contrast, the clients **utilize** the services and resources of the server and generally do not provide any services and resources themselves in the network.

Provided they are authorized, every client can access every server system in the local network. Advanced Server for UNIX also supports so-called trust relationships between domains, which permit the user to access resources in other domains.

2.2 Shared resources

The resources provided by a server system for the network are known as **shared resources**. Shared resources are protected against unauthorized access (for more detailed information, see section on "Security concept").

Advanced Server for UNIX provides users with the following types of resources, which can be shared by one or more users in the network:

- Shared directory
- Shared printer
- Interprocess communication resource *IPC$*
- Network-wide administration (Resource *ADMIN$)*

2.2.1 Names in the network

In the network, servers, domains, clients, users, and resources are assigned **unique** names. The following table describes briefly the various types of names in the network.

Name	Meaning
System name	Name of the UNIX system
Computername, server name	Each server and client in a network must have a unique computername. A proposed server name is derived from the system name when it is being installed first (maximum 15 characters).
Username	The administrator provides each user in a network with a unique username for identification. **i** Users from other domains with which there is a trust relationship are addressed with <domain name>\<username>.
Sharename	The administrator assigns a unique sharename to each shared resource on a server.
Network name, UNC name	The network name consists of the server's computer name and the sharename of one of this server's resources. A connection to a resource is established, for example, with a network name.
Domain name	The domain gets a domain name when you install the primary domain controller. By default, it consists of the first eleven characters of the system name plus the suffix *.dom* (maximum 15 characters).

2.2.1.1 System name

Each UNIX system has a unique name in the network, which can be displayed using the command *uname -n* and set as the *network node name* using the SYSADM utility program.

⚠️ In order to avoid problems, it is strongly recommended that the system names you assign are unique throughout the network. While the same system name may appear several times in different DNS domains, even in the same network, Advanced Server for UNIX uses the system name internally for generating names which must always be unique.

2.2.1.2 Computername (server name)

Servers and clients must have a unique name in the network, known as the computername. The computername of a server is also called server name.

A proposed server name is derived from the first 15 characters of the system name when it is being installed first. The terms computername and server name are used synonymously in relation to the server.

It can be changed to any name (with a maximum of fifteen characters) during installation. The server name is stored automatically in the *lanman.ini* file on the server. It is part of the network name and may only be changed after the installation using special utility programs. For further information please refer to the section entitled "Changing server attributes" in the chapter entitled "Administration guidelines".

i
- The server name consists of up to fifteen characters: letters from a to z, numbers from 0 to 9 and the special characters -.~!#$%^&()_{}.

- In the previous Version 2.0, the server name for the LAN Manager/X server had the suffix *.serve*. Please note that both LAN Manager/X Version 2.2 and Advanced Server for UNIX up to version 4.0A10 propose the suffix *.srv* for a first installation instead.

- Since Advanced Server for UNIX V4.0B, the default server name proposed during the first installation is built from the system name without an extension.

i
- In order not to run into problems when upgrading to upcoming NT/AS/X-versions in the future, all tools requesting a server name during installation or reconfiguration offer the DNS-compatible host name ('*uname -n*') as the default server name. The extension *.srv* can still be used, but is not recommended and no longer offered as a default. Installation/configuration scripts now inform the administrator about DNS-incompatible server names.

2.2.1.3 Username

Every user of a client is assigned a username by the administrator, which is unique throughout the network. Users are identified by their usernames in the network.

| **i** | The username consists of three to fifteen characters: letters, numbers, spaces and special characters without / \ * ' " '!. Use a maximum of eight characters to achieve unique mapping between UNIX names and Advanced Server for UNIX users. It is not recommended to use umlauts or characters like the euro symbol in usernames. |

2.2.1.4 Sharename

If a resource on a server is shared, it gets a sharename. The sharename identifies the resource on the server. A sharename for a resource must appear only **once** on a server, however the same sharename may be used several times on **other** servers in the network. The sharename is part of the network name.

| **i** | The sharename consists of up to twelve characters: letters (no umlauts), numbers, and special characters. For MS-DOS clients, the sharename must comply with the MS-DOS conventions. |

Example

The command *net share sf1=c:/u1/public* is used by the administrator to share the directory */u1/public* as a resource for the network, *sf1* is the sharename of this resource.

| **i** | ● The character string *c:* must **always** precede the resource pathname when sharing directories. |

2.2.1.5 Network name

A client user sets up a connection to a shared resource using the network name. The network name of a shared resource consists of the computername of a server and of the **share**name of the resource shared on this server.

Example

The command *net use j: \\server1\sf1* is used by the client user to set up a connection to the shared resource with the **share**name *sf1*, which is located on the server with the computername *server1*. The network name of the resource in this case is *\\server1\sf1*. Using the command *dir \\server1\sf1* or *dir j:* you can then display the contents of the shared directory.

2.2.1.6   **Domain name**

A domain gets its domain name during installation of the primary domain controller. The backup domain controllers are assigned during installation of a domain. The assignment of a client to a domain is defined while it is being installed; it can be reconfigured later or, on some clients, modified temporarily with the *net logon* command, for example.

The trust relationship concept means that it is easier to manage and use several domains. (The manual entitled "Concepts and Planning" contains further information relating to this topic.)

The default domain name consists of the first eleven characters of the system name plus the suffix *.dom*, e.g. the domain name of the server *server1* would be *server1.dom*.

> **i**   The domain name consists of up to fifteen characters: letters from a to z, numbers from 0 to 9 and the special characters -.~!#$%^&()_{}.

The domain name may only be changed following installation using special utility programs. Please refer here to the section entitled "Changing server attributes" in the chapter "Administration guidelines".

2.2.2   **Mapping of file attributes through Advanced Server for UNIX**

This section contains information on how Advanced Server for UNIX maps characters and file attributes between the server and clients.

DOS

The following DOS attributes are mapped on the server by Advanced Server for UNIX:

- r (read only)
- d (directory)
- h (hidden)
- s (system)
- a (archive)

The attributes *r* and *d* are mapped to the relating UNIX mechanisms. The attributes *a, s* and *h*, as well as any possible combination of these are translated to Advanced Server for UNIX by means of UNIX group names. The table below, for example, shows how the MS-DOS file *BSP.DAT* with the attributes *a* and *h* and the MS-DOS file *READONLY.BSP* with the attributes *a, r* and *h* are mapped under UNIX:

Permissions	Owner	Group	Filename
`rw-rwsr--`	`lmxadmin`	`DOS-a-h`	`bsp.dat`
`r--r-sr--`	`lmxadmin`	`DOS-a-h`	`readonly.bsp`

OS/2

The extended file attributes of the HPFS (OS/2 extended attributes) contain additional information on OS/2 files such as long filenames or comments, for example. The UNIX file system does not support all attributes, so Advanced Server for UNIX creates a hidden shadow file for each file with extended attributes. This shadow file has the default name *.EA@<filename>*. For example:

The *autoexec.bat* file has a shadow file with the name *.EA@autoexec.bat*.

> **i** The period (.) as the first character in the filename hides the file under UNIX. The hidden files are not displayed with the *ls* command. To do this, use the *ls -a* command.

You must try to ensure that these files are only handled under OS/2. If you delete or copy the files under UNIX, you should also delete or copy the shadow file accordingly.

> ⚠ It is not possible to copy these files with their attributes from an Intel-based to a RISC-based UNIX system using UNIX commands, as the internal formats do not match. When the server system is changed, copy the files from the first server to an OS/2 PC first and from this PC to the other server.

The shadow files of LAN Manager/X 2.2 are compatible with those of Advanced Server for UNIX and can be continued to be used unchanged.

You should also be aware that with the current version of Advanced Server for UNIX, files with extended attributes cannot be transferred via the replicator service and also cannot be copied locally, for example, with *lmshell*.

The default value of the *EAFilePrefix* registry parameter has changed since Version 4.0A10 of Advanced Server for UNIX. Instead of *.ea@*, the value *.EA@* is now used to ensure compatibility with Advanced Server for UNIX V3.5.

Existing configurations are not modified during an upgrade installation. You should therefore use either the Registry Editor or the *regconfig* command to set the value of the *EAFilePrefix* parameter in the registry to *.EA@* under the key
`SYSTEM\CurrentControlSet\Services\AdvancedServer`
`\FileServiceParameters.`
If you previously operated Advanced Server for UNIX V4.0A10 with the setting UseEAs=1, you will now have to rename all hidden shadow files with the extended file attributes.

Use the following command to display all existing shadow files:

```
find / -type f -name '.ea@*' -print
```

The following shell script can be used to give all old shadow files the new prefix *.EA@*:

```
for eafile in 'find / -type f -name '.ea@*' -print'
do
   newfile="'echo $eafile | sed 's/\.ea@/.EA@/''"
   echo rename "$eafile" to "$newfile"
   mv "$eafile" "$newfile"
done
```

> ⚠ Advanced Server for UNIX will only find the extended attributes of a file if the associated hidden shadow file has the same prefix as is set in the current Advanced Server for UNIX configuration instance. It would be best to change the file and directory names and the registry parameters when the server is stopped and then start the server again.

2.2.3   Share table (list of shared resources)

All shared resources are comprised in the share table. Every resource shared using the command *net share* is entered in the share table. Every resource deleted using *net share /delete* is removed from the share table.

Advanced Server for UNIX stores the share table in an internal format in the registry. The share table is loaded automatically each time Advanced Server for UNIX is started. The various types of shared resources are introduced in the following sections.

2.2.4   **Shared directory**

A shared directory is a file tree of a server system, which was shared for the usage in the local network. Users can access the shared directory from a client using the **share**name. In this case, users work with the shared directory as they would with a local drive or directory on their clients.

> **i**   The security check is not taken into account in the following description in order to avoid complexity.

The administrator is responsible for assigning a directory (for example with the server named *server1*) to a sharename. The administrator links the local directory name */u1/public1* to the sharename *sf1* using the command: *net share sf1=c:/u1/public1*, at the same time sharing this resource for use in the local network.

> **i**   ● The directory must have been created beforehand, otherwise the administration interface reports an error.
>
> ● The character string *c:* must **always** precede the resource pathname on the Advanced Server for UNIX.

Access information is assigned to shared directories using *net perms,* which is stored in the AS/X database (acl).

For example, using *net perms c:/u1/public1 /grant group1:fullcontrol* the group *group1* is assigned read, write, and execute permissions as well as the permission to create files and directories, to change or delete attributes and to change the permissions for these direc-tories.

> **i**   ● UNIX permissions have a higher priority than permissions assigned using *net perms*. Thus, for example, the above directory has **no** write authorization if the permissions *r-x-r-x-r-x* are set up using UNIX. If problems arise, the UNIX permissions can be set temporarily to *rwxrwxrwx* to establish whether the missing UNIX permissions have caused the problem.

Authorized users can assign this shared directory to their clients. The network name of the shared directory (in accordance with DOS naming conventions) *\\server1\sf1* is linked on the client to a local drive letter, e.g. *j:*, using the command *net use j : \\server1\sf1*.

> **i** The user may have to allow additional drive letters on the client in the configuration file *config.sys* using the command *lastdrive*.

The client user can then access the shared directory using the drive letter *j:*. All attempts to access files (copying files and directories, editing files etc.) made by the user on drive letter *j:* are mapped on the file system of the server.

The shared directory can therefore be used by a user or a user group. If several users wish to process a file at the same time, entire files or parts of files can be locked using file locks for the duration of processing. Read and/or write locks are available.

> **i** Older MS-DOS versions or programs are not *network-ready*, in this case only one user at a time can access a file.

Advanced Server for UNIX maps the interfaces available under the MS-DOS, OS/2, Windows, Windows for Workgroups, Windows 95/98 and Windows NT operating systems to UNIX mechanisms in order to manipulate files and directories.

For further information, please refer to the manual entitled "Concepts and Planning".

2.2.5 Shared printer resource

As an administrator, it is possible to share the printer queues for the network. The administrator can also check the status of the printer queue using the corresponding administration commands and can manipulate the print jobs (delete, for example).

The printout waits in the printer queue and is then printed on a printer connected to the UNIX system or on a printer connected to a specially configured client (shared client printer). For further information, please refer to the chapter entitled "Configuring Advanced Server for UNIX".

2.2.5.1 Printer spoolers

Interfaces for the following spoolers are available for Advanced Server for UNIX:

- Standard spooler (AT&T® high performance interface)
- SPOOL V4.2 (and above) for all Reliant UNIX systems

Please refer to the section "Configuring printers on the UNIX system" for information on how to configure the interface to the spooler.

2.2.5.2   Shared client printer

It is also possible to route the output of the printer spooler to a printer which is connected
to a client (shared client printer). For further information, please refer to the manuals entitled
"MS Network Client V2.2" and "User's Guide for MS-DOS Clients".

2.2.5.3   Printer server

The output of the printer spooler can also be routed to server and client systems that can
share a printer resource (e.g. Windows for Workgroups, Windows NT).

2.2.5.4   Sharing a printer

The administrator shares the printer queue on the server (with the computername *server1)*.
For example, you can enable a printer group or class with the sharename *sp1* using the
net share sp1 /print command.

For example, the user of the client with the computername *cl3* links to a shared printer. To
do this, he/she assigns the network name *\\server1\sp1* with *lpt1* using the command (in the
MS-DOS naming conventions) *net use lpt1: \\server1\sp1*. The user can now work on *lpt1:* for
all print jobs as he/she would on a local printer.

> **i** ● For Windows NT-Style Printing the sharing of a printer with UNIX commands is
> no longer recommended.

For further information, please consult the manual entitled "Concepts and Planning".

2.2.6   Interprocess communication resource, IPC$

Advanced Server for UNIX can be used to implement distributed applications: Application
processes on the server system exchange data over the network with application
processes on clients. The resource *IPC$* enables this communication using LM named
pipes and mailslots.

Special functions also allow the administration of Advanced Server for UNIX using
programs. For additional information please refer to the manual "API Reference" and in the
manual pages for the API, which are supplied with Advanced Server for UNIX. The
following sections contain further information on interprocess communication.

> **i** The *IPC$* resource is automatically shared.

2.2.6.1   **LM named pipes**

Advanced Server for UNIX also provides LM named pipes. They are bidirectional communication channels for interprocess communication in the network. They differ from UNIX® named pipes.

The following example describes the basic procedure for setting up and clearing down an LM named pipe: An application process with *root* authorization creates a named pipe on the server. The client process on the client sets up a connection to the known named pipe over the local network. Both processes can then exchange data using the LM named pipe. When the data exchange has ended, the LM named pipe is deleted.

> **i**   Advanced Server for UNIX must be running in order to use LM named pipes.

Example

The *root*-authorized process on the server *server1* creates a LM named pipe with the name *srvp* using the function *DosMakeNmPipe ("/PIPE/srvp" , &reference,...)* and waits using the function *DosConnectNmPipe (reference)* for a connection to be set up *(_dos_open)* to the client process.

The client process – under MS-DOS, OS/2, Windows, Windows for Workgroups, Windows NT or Windows 95/98 – opens the named pipe with *_dos_open ("\\\\server1\\PIPE\\srvp",&cfd,...),* and data can now be exchanged between the processes.

> **i**   The character "\" must always be specified twice in a C program since the first "\" is interpreted as an escape character.

The connection to the LM named pipe is set up using the resource *IPC$*. If a client process on a client wishes to communicate with an application process on the server, this resource is connected automatically.

If the LM named pipe is to be closed again after the data exchange, the client process closes this named pipe using *_dos_close(cfd)*.

The server process can then clear down the connection using *DosDisconnectNmPipe(reference)* and delete the named pipe using *DosClose(reference)*.

Further information on LM named pipes can be found in the manual "API Reference" and in the manual pages for the API.

2.2.6.2 **Mailslots**

Mailslots are unidirectional communication channels. They are created by an application process on the server or by a client process on the client. In contrast to LM named pipes, several processes can write to the same mailslot simultaneously but only the process that created the mailslot can read from it.

Example

A reading process (on the server *server1*) creates a mailslot with the name *ms*. This program waits for messages for the mailslot. The writing program sends a message to the network name of the mailslot *//server1/mailslot/ms*.

The developer implements this in the program sources for client processes using the API functions, in compliance with MS-DOS and OS/2 naming conventions:

In the reading program using *DosMakeMailslot(\\\\mailslot\\ms, ..)* and in the writing program using *DosWriteMailslot(\\\\server1\\mailslot\\ms, ,..)*.

The following calls are used in the processes on the server:

In the reading program using *DosMakeMailslot(//mailslot/ms, ..)* and in the writing program using *DosWriteMailslot(//server1/mailslot/ms, ,..)*.

2.2.7 **Using the UNIX operating system from the PC**

You can execute UNIX commands from the PC over the netrun service. For further information, please consult "Chapter 5 - Enhanced Reference" in the manual "User's Guide for MS-DOS Clients".

2.3 Services

The following additional services can be configured in Advanced Server for UNIX:

Service	Comments
Alerter	configurable
Auditing	configurable
Replicator	configurable
Netlogon	configured when server is installed
Timesource	configurable
SNMP Extension Daemon	installed and configured with the *asxsnmp* package
Netrun	configurable
Browser	configured automatically
Windows Internet Naming Service (WINS)	configurable

The following sections briefly explain these services.

2.3.1 Alerter

This service sends alarm messages to certain client users. For example, alarm messages are initiated if access permissions are violated when using shared resources and if important limits are exceeded (maximum error rate when accessing networks and hard disks and maximum number of logon attempts).

2.3.2 Auditing

Important activities in the network are recorded by this service. These include starting and stopping the server, user sessions and utilization of shared resources by specifying the **user**name and time. This list can be displayed if required.

2.3.3 Replicator

The Replicator service allows specific files and directories to be copied automatically from the export server to one or more of the specifically configured import servers (server and clients with the Replicator service).

The Replicator service on the export server monitors the export directory, containing the designated files and directories. If a file in the export directory is changed or directories and/or files are added or deleted, the Replicator service updates these directories and files under the import directories.

2.3.4 Netlogon

The netlogon service connects a specified server to a domain. This simplifies the administrator's duties: within a domain a user account only needs to be managed and maintained on one server. User accounts can be maintained on each server using the single system image (SSI), the accounts is thus centrally managed and distributed.

The netlogon service ensures that there is an identical copy of the user account on the primary domain controller and the backup domain controllers of the domain. The netlogon service also processes the logon procedures of the clients.

If you are using the Netlogon service, the servers in a domain have several roles:

Server role	Task
Primary Domain Controller	Maintains and distributes the master copy of the user account database, handles "logon" requests.
Backup Domain Controller	Receives a copy of the user account database, handles "logon" requests.

The netlogon service also provides connections to other domains with which a trust relationship exists.

2.3.5 Timesource

This is a Advanced Server service which identifies a server as the time source for a domain. Other servers can synchronize their clocks with the time source.

i UNIX servers **cannot** synchronise their clocks using this service.

2.3.6   SNMP service

The SNMP (Simple Network Management Protocol) service is installed and configured with the *asxsnmp* package. This daemon process is started and stopped automatically with Advanced Server for UNIX. It provides a connection between Advanced Server for UNIX and the SNMP agent. Please refer to the manual "SNMP Service" for further information. In addition, the "Emanate Master Agent" (Slsnmpdm) can also be used with the "SINIX SNMP Agent Adapter" (Slsnmpd).

2.3.7   Netrun service

The Netrun service enables you to run a UNIX program on Advanced Server for UNIX from an OS/2 or an extended MS-DOS client.

The corresponding user interface is not available on Windows for Workgroups, Windows 95/98, and Windows NT.

2.3.8   Browser

The browser service extends the announce messages that normally occured in the LAN Manager/X environment (every 60 seconds). This new mechanism consists of a system of hierarchically ordered browser programs that are used for searching domains, servers and resources within the network. The browser service function is provided in the Explorer/File Manager and Windows Print Manager. Relevant shared resources on other servers and on servers in other domains can be found using this system.

However, the browser service can only be used by a Windows NT server, a Windows NT workstation, a Windows 95/98 client, or a Windows for Workgroups client. It is not available on a Windows or MS-DOS client.

For further information in this regard, please refer to the "Concepts and Planning" manual.

2.3.9   Windows Internet Naming Service

The Windows Internet Naming Service (WINS) is used to map computernames to IP addresses. For further information please consult the chapter describing "Implementing WINS".

2.4 Connection management

The following sections contain descriptions of a network connection between the server and the client. The terms "session" and "network connection" are explained and the security concept of Advanced Server for UNIX is introduced.

2.4.1 Sessions

A session is set up between a client and a server the first time when a connection from the client to a server resource was successful. (N.B. Windows NT clients sometimes have two sessions to the same server). Every client can have several sessions with several servers.

> **i**
>
> - Sessions are also set up between the servers in a domain; likewise, local sessions exist on the server. The command *net session* shows all current sessions.
>
> - The *MAXCLIENTS* parameter restricts the number of sessions that can exist simultaneously. See also section "Parameters" in chapter "Lanman.ini File" in this manual.

2.4.2 Connection to a resource

If the client user successfully connects to a resource first time from a server, a session is automatically set up for this server (see above). However, if there is already a session with this server then a new connection is set up to the required resource of this server using the existing session.

A connection is explicitly cleared down from a client using the command *net use* and the option */delete*. On the other hand, if the session with a server is shut down then all connections to the shared resources of this server are closed.

2.4.3 Security concept

In order to protect shared resources from unauthorized access, the **user level security** concept is always used in Advanced Server for UNIX.

Users must legitimate using their username **and** password once in the domain to be able to access the shared resources for which they are authorized.

> **i** Even after you have successfully logged onto a domain, you may need to carry out further steps to be able to use the resource of a server in another domain:
>
> - If you have a different password for the same user name in another domain, you must enter this password.
>
> - If you have a different user name in another domain, you must log off from the previous domain and log onto the new domain or alternatively make the connection with the resource as a different user.
>
> - If there is a trust relationship between the two domains there is no need to create the user account a second time. You can also access the resources in the other domain if you are a legitimate user in your domain. For further information, please refer to the "Concepts and Planning" manual.

2.5 Administration of Advanced Server for UNIX

The administrator manages and controls the shared resources, users, and their permissions on the UNIX server.

Advanced Server for UNIX is managed via the graphical interface of the Windows NT Server Tools. Using this administration program you can carry out your administration tasks remotely, e.g. from a Windows NT system (server or client) or a Windows, Windows for Workgroups or a Windows 95/98 client if these utilities are installed there.

The administration of Advanced Server at the command prompt is described in chapter "Administering Advanced Server at the Command Prompt".

Administration functions can also be carried out from programs via the programming interface (API). For further information please refer to the manual "API Reference" and the API manual pages.

2.5.1   Remote administration

You can execute remote administration from any of the following systems:

- Windows NT client and server

- Windows 95/98, Windows for Workgroups, or Windows client

- Extended MS-DOS client

- UNIX system running Advanced Server for UNIX

2.5.1.1   Remote administration under MS-DOS

The administration shell is started using the command
net admin \\<servername> [password] /command and thereafter commands are issued using
the command *net <subcommand>*.

The command *exit* or the key combination $\boxed{\text{CTRL}}$ and $\boxed{\text{Z}}$ can be used to exit the adminis-
tration shell and return to the operating shell system.

2.5.1.2   Remote administration under Windows

Remote administration is possible from any system on which MS Windows, Windows for
Workgroups, Windows NT, or Windows 95/98 is installed. For this reason, the Windows NT
Server Tools are supplied with Advanced Server for UNIX. Special NT Server Tools have
been developed for the Windows client. Since they have the same functionality, a standard
administration interface is available to you on all clients and workstations.

2.6   Programming interface (API)

Advanced Server for UNIX provides a programming interface (application programming
interface (API)), which can be used to develop distributed applications in the network. The
API provides functions, for example, for the LM named pipes and mailslots. You can also
execute administration functions from your own programs.

With these functions, you can develop your own programs on the server operating system
which can exchange data with client processes. Advanced Server for UNIX itself uses the
API for administration tasks.

The API functions and changes since LAN Manager/X V2.2 are described in the manual
"API Reference" and in API manual pages. For information on how to install the manual
pages, please refer to the section "Installing the asxman package".

2.6.1   Remote Procedure Call (RPC)

Advanced Server for UNIX supports the Microsoft Remote Procedure Calls (RPCs). This platform-independent mechanism is used for interprocess communication within a client-server architecture.

The new functions of Advanced Server for UNIX are called up internally via RPC.

2.7   Compatibility

2.7.1   Client software

The functionality of Advanced Server for UNIX corresponds to the server part of Microsoft Windows NT Server. The Advanced Server for UNIX product uses the SMB protocol (**S**erver **M**essage **B**lock) and is thus compatible with the following products:

- MS Networks 1.01 (not included in delivery package)
- MS Network Client MS-DOS V3.0 (included in delivery package)
- MS LAN Manager MS-DOS V1.1 (not included in delivery package)
- MS LAN Manager MS-DOS V2.0 (not included in delivery package)
- MS LAN Manager MS-DOS V2.1 (not included in delivery package)
- MS LAN Manager MS-DOS V2.2c (included in delivery package)
- MS LAN Manager OS/2 V1.1 (not included in delivery package)
- MS LAN Manager OS/2 V2.0 (not included in delivery package)
- MS LAN Manager OS/2 V2.1 (not included in delivery package)
- MS LAN Manager OS/2 V2.2 (not included in delivery package)
- MS Windows for Workgroups V3.1 (not included in delivery package)
- MS Windows for Workgroups V3.11 (not included in delivery package)
- MS Windows 95 (not included in delivery package)
- MS Windows 98 (not included in delivery package)
- MS Windows NT Version 3.1 and later, for administration Version 3.51 and later (not included in delivery package)

<table>
<tr><td>**i**</td><td>

● The RFC 1001/2 implementation (NetBIOS™ on TCP/IP) is the basis for communication with the server system.

● The MS LAN Manager OS/2 products referred to above are only available for OS/2 V1.x.

● If you are using the client with MS LAN Manager V2.0, you must set up the TCP/IP communication software with the Siemens product LAN1 Vx.

● The product MS LAN Manager provides TCP/IP with Version 2.1 and later; with this product you have the option (e.g. if you want to implement an emulation in parallel) of incorporating the product LAN1 Vx.

● The product LAN1 is not supplied with Advanced Server for UNIX.

● The commands referred to, i.e. *udir, uren,* and *uchmod*, cannot be used on all clients. In this case you should use the corresponding UNIX commands.

</td></tr>
</table>

2.7.2 Role of the server

You can install Advanced Server for UNIX and LAN Manager/X in a domain with Windows NT servers. Only one Advanced Server for UNIX or Windows NT server can be installed as a primary domain controller in a single domain. LAN Manager/X servers **cannot** take on the server role of primary domain controller.

<table>
<tr><td>**i**</td><td>The server roles of member server and standalone server have been omitted from Advanced Server for UNIX.</td></tr>
</table>

2.7.3 Server hardware

Advanced Server for UNIX can be operated via any network with TCP/IP capability, e.g. via Ethernet® or Token Ring™.

2.7.4   LAN Manager/X V1.1

Version 2.0 and later of LAN Manager/X or Advanced Server for UNIX are compatible with
Version 1.1 as regards the following:

● The environment variable *$xLMX*

● The environment variable *$LM_HOMEDIR*

● The file */etc/rclmx*, in which the environment variables are set

● The automatic call of */etc/rclmx* from the script */etc/profile*

● The utilities *dos2unix* and *unix2dos*, which can be called under the system path and
under *$xLMX/bin*

● The programs *net* and *lm*, which can be called under *$xLMX/bin*

● The script *lmx* for starting and stopping the server (with the NetBIOS administration
program) and the server status display.

Important changes to the previous version for Version 2.0 and later:

● The domain concept is supported.

● You can route the output of the printer spooler to a printer that is connected to a client
(shared client printer).

● The share table and usernames are saved in a different format (if required this data can
be converted manually for the new version).

● The MS-DOS notation must be used with the command *net*, for example options may
only be introduced with the character "/".

● For shared directories, *c:* must always be specified with the command *net share*,
e.g. *net share sf1=c:/u1/sf1*.

● Programs which create LM named pipes must have root authorization.

● LAN Manager/X must be started when creating the LM named pipes.

● Remote systems can be administered from a client with the command *net admin*. For
this purpose, the server name must always be specified e.g.
net admin \\server1 /command

● The prefix *net* must always be set in the administration shell.

● The configuration file is now called *$xLMX/lanman.ini*, and only contains **values which
deviate** from standard. The program *srvconfig* should always be used for viewing or
modification functions. The chapter "Lanman.ini File" contains a description of this.

2.7.5   LAN Manager/X V2.0

Version 2.2 and later of LAN Manager/X or Advanced Server for UNIX is compatible with Version 2.0 as regards the following:

● The API of Version 2.0 is a subset of the API of Version 2.2.

Important changes to Version 2.0

● The API of Version 2.0 has been extended.

● The Targon/31 system is no longer supported.

● You are now provided with a suggested name for the server name consisting of the first nine characters of the host name and the suffix *.srv* instead of *.serve* (e.g. *server1.srv*).

● In order to start a UNIX program from the PC, you should now use the command *netrun* (extended MS-DOS client) instead of *uexec*.

● In the case of an update installation, the configuration of Versions 2.0 and 2.2 can be adopted.

● Server attributes such as server role, server name etc. can be changed afterwards with a utility program.

● The servers and clients can be located in different subnets.

● You can save the entries for installation in a file and carry out the installation at a later date. This file also makes it possible for you to carry out "automatic installation" – even on other UNIX systems.

● Individual services can be started and stopped.

● The command *net version* shows which version of LAN Manager is installed on the current system.

2.7.6   LAN Manager/X V2.2

Advanced Server for UNIX since V3.5 is compatible with LAN Manager/X V2.2 as regards the following:

● Advanced Server for UNIX supports the full functionality of LAN Manager/X V2.2.

● Interoperability is possible both with LAN Manager V2.x systems and with LAN Manager V2.0 and V2.2 clients under MS-DOS, OS/2, Windows 3.1, and Windows 3.11 (Windows for Workgroups).

● The environment variable *$xLMX* and the *lmx* command are still available.

Important changes to Version 2.2

Advanced Server for UNIX has the following new or modified features and functions:

> **i** New and modified commands or procedures are explained in comparative tables with comments in Appendix A of the manual "Concepts and Planning". Please refer to the tables for these descriptions.

● Like a Windows NT server, Advanced Server for UNIX can take on the server role of primary domain controller in a domain.

● The server roles of "member server" and "standalone server" have been omitted. In an upgrade, the member server is given the role of "backup domain controller" and the standalone server is given the role of "primary domain controller".

● The share level security concept is no longer supported. In the upgrade installation, the server is given the server role of primary domain controller with the user level security concept.

● Modified processing and defaults for access permissions

● The environment variable *$xASX* exists in parallel to the environment variable *$xLMX*. The new command *asx* (e.g. *asx start*) corresponds to the *lmx* command, which can still be used.

● The Replicator service is no longer started automatically.

● Trust relationships can be set up between domains. These facilitate the use of resources in other domains.

● **Global and local groups** as well as **global and local user accounts** are supported.

● **Customizable user environments**: A specific user environment is recorded by means of defining a user profile or by allocating a logon script regardless of which client the user logs on from.

- **Administration**: The primary administration tool for Advanced Server for UNIX are the Windows NT Server Tools, which can be used from a Windows NT workstation or a Windows NT server. They are also available under Windows 3.1, Windows for Workgroups, and Windows 95/98.
  The NT Server Tools replace the graphical user interface *netadmin*.
  Administration tasks can still be carried out via the UNIX console.

- **Monitoring**: The network is monitored with the graphical monitoring tools Event Viewer, Performance Monitor, and Server Manager which supplement the Alerter service.

- **New security concept**: Advanced Server for UNIX has a more extensive security concept, which consists of user identification, user authentication, access control, and access logging.

- **Remote Procedure Calls (RPC)**: Advanced Server for UNIX supports the Microsoft Remote Procedure Calls (RPCs).

- **Browser service**: This service is used by Windows applications like Explorer/File Manager and Print Manager as well as by the *net view* command.

- **Support for UNIX quotas** (configurable).

- **Name Space Mapping**: Mapping of long file names to DOS 8.3 naming conventions.

- **Mixed Case Support**: Configurable support for uppercase in file and directory names.

- **New utilities**: accget, accadm, and userget.

- **Interoperability with Windows NT 4.0 and Windows 95/98**.

- **Configuration of NetBIOS** (For further information please refer to the section entitled section "Configuring NetBIOS").

- **Migration tools**: Advanced Server for UNIX has migration tools with which existing user accounts, access lists etc. are converted.

- No licensing with key diskettes; no additional user extensions.

- Manual pages for the API; the *NetAccessEnum* function has been omitted from the API.

- Utilities for generating installation diskettes for clients.

- The *net error* and *net audit* commands are obsolete; the *net access* command as well as the new *net perms* command can only be invoked with parameters.

- Version 3.0 of MS Network Client

- German language message texts in a separate package

- In the *lanman.ini* file a series of parameters have been omitted. After an upgrade installation, these parameter entries should be removed manually.

- The *add_access*, *add_user* and *buildacc* utilities have been omitted. Instead of *lmxsetup* and *lmxinfo*, *asxsetup* and *asxinfo* are available.

- With Advanced Server for UNIX, the *AT&T* and *SPOOL V4.x* spoolers are supported.

2.7.7 Advanced Server for UNIX V3.5

Advanced Server for UNIX V4.0 is compatible with V3.5 except for the following:

- Intel systems are not longer supported (e.g. SINIX-L/-M/-Z and UnixWare).

- AS/X V4.0 needs at least SINIX / Reliant UNIX -N/-Y V5.43C00.

- AS/X V4.0 needs additional software installed on the SINIX / Reliant UNIX (see section "Hardware and software requirements").

Important changes to V3.5:

Advanced Server for UNIX has the following new or modified features:

- NT style printing is supported and gives the possibility to install printer drivers for Windows 95/98 and Windows NT on the server. It is no longer neccesary to install the printer driver on each client manually.

- A Windows NT compatible WINS-service is available with Advanced Server for UNIX V4.0. This makes it much more easy to operate the server and clients in a routed environment.

- Registry: Most of the Advanced Server for UNIX configuration is stored in a binary Registry file. The configuration can now be done via the Windows Registry Editor.

- SMB Signatures: SMB signing provides a message authentication by placing a digital security signature into each SMB, which is then verified by both the client and the server. For more information about SMB signatures take a look at Microsoft Knowledge Base.

- It is possible to select the language of builtin names (domain language) before the initialization of the Advanced Server for UNIX databases takes place (e.g. the local group "Administrators" becomes "Administratoren" and "builtin\guest" becomes a "vordefiniert\Gast").

- New command *net computer* to display or modify the list of the computer accounts in the domain database, *net sid* to translate Security Identifiers (SIDs) into account names and vice versa.

- German language message texts are integrated in the *asxserver* package and can be activated with a utility.

2.7.8   Advanced Server for UNIX V4.0A

Advanced Server for UNIX V4.0B has the following new or modified features:

- DNS-WINS-integration: new NetBIOS version to support the DNS-WINS- Integration of Reliant UNIX V5.45. For a documentation of the DNS-WINS integration, please refer to the manuals of the operating system.

- Compatible with SIthreads package (used for the WINS service).

- Compatible with Reliant UNIX V5.45.

- Integration with RMS (Reliant Monitor Software).

- Euro symbol support.

- All AS/X files are now located below the */var/opt/lanman* directory.

- The *joindomain* command now supports additional command line options allowing non-interactive mode operation.

- New utilities: *printadm*, *repladm*, *userrights*, *promote*

- Online manual pages for all AS/X commands, new manual pages for:

  – new utilities: *printadm*, *promote*, *repladm*, *userrights*

  – other utilities: *accadm*, *accget*, *addclipr*, *addserver*, *asxcheck*, *asxinfo*, *asxperf*, *asxpwexp*, *asxregview*, *delclipr*, *delserver*, *setdomainlang*, *setlang*, *setspooler*, *userget*

- *asxregview* enhancements.

- Improved *asxinfo* and *asxcheck* utilities.

- New */HOMEDIRDRIVE* option for the *net user* command.

- New options *-o* and *-M* for *acladm* utility, new additional options *-f* and *-n* for *acladm -C*.

- New option *-d* for *regconfig* utility, support pathnames with "/" and "\".

- New option *-q* for *blobadm* utility to support low level blob file compression.

- Improved performance during the blob file grow process (used for all Advanced Server databases).

- Improved installation of *asxserver* package.

- Default of servername without ".", that means *.srv* is omitted.

- The *.srv* extension for server names is no longer offered as the default. Warnings occur if server names are incompatible with DNS names.

- Share table information moved to registry.

- *lmshare* command now supports printer driver fields.

- Updated description "Compression of the ACL Database"

- Updated description: "Moving directories with existing access permissions"

- New configuration option to spoolin print jobs with the User ID of the mapped UNIX user instead of the User ID of "root".

- New registry parameters: *ConnectTimeout*, *MaxMpxCt*, *NetPopup*, *SpoolinAsUnixUser*, *DeletedPrintJobTimeOnQ*

- New lanman.ini parameters: *maxspoolfds*, *os2searchfix*, *ProductType*

- The following registry parameters are no longer supported: *ShareCacheCount*

- Removed limit of 128 trust relationships.

- New range 0 - 2 for the value of the *UseUnixLocks* registry parameter.

- The limits of the *NumCLIENT_SESSION* and *NumSERVER_SESSION* registry parameters are watched and resource shortages are reported.

- *UnixQuotas* registry parameter also used to restrict the user's disk space for non-root users (if supported by the file system).

- Implemented Level II Oplocks to improve co-operation with NT clients.

- NetBIOS keep alive timeout is now configurable and changed from1 minute to 30 minutes to reduce the number of frames on the network.

- New NetBIOS tunables *NBRFCMAXDGMS* and *NBRFCMAXFRAGS*.

- *NBRFCKALIVE* tunable now used to set the keep alive timeout in minutes. Default changed to 30 minutes.

- The time when a NetBIOS name conflict occured is also displayed when calling *nbrfcdiag -n*.

- The *tcp_nodelay* functionality is no longer configured as a lanman.ini parameter. Now it is configured at the NetBIOS daemon startup (*-n* option).

- NetBIOS daemon startup parameters now configured in a configuration file.

- NetBIOS diagnostic messages now written to *syslog*.

- Additionally, the IP address can be used with the *-E* and *-D* options of the *nbconfig* command.

- New *-a*, *-A* and *-q* options for *nbtstat* utility.

- New NetBIOS *findbrow* utility on UNIX.

For a detailed description of the new options and commands, please refer to the description of the commands in the online manual pages or in this manual.

3 Advanced Server for UNIX architecture

This chapter contains descriptions of the architecture of Advanced Server for UNIX. Communication takes place via TCP/IP (Transmission Transport Protocol/Internet Protocol).

i   Processes required for the administration of NetBIOS are not considered here!

3.1 Process model

A series of processes are started in order to carry out specific tasks when Advanced Server for UNIX is started. The following sections contain a short description of these processes and their tasks.

The number of processes depends on the current configuration which is stored in the *lanman.ini* file and in the Registry.

3.1.1 Communication between the processes

Data which is required by all Advanced Server for UNIX processes is stored in a shared memory segment. This data includes, for example, the file and lock tables. Data that is not required by all processes is retained by the control process and made available as required by means of interprocess communication.

3.1.2 Overview of the processes

The following table lists the daemon processes active when Advanced Server for UNIX has been started in a maximum configuration.

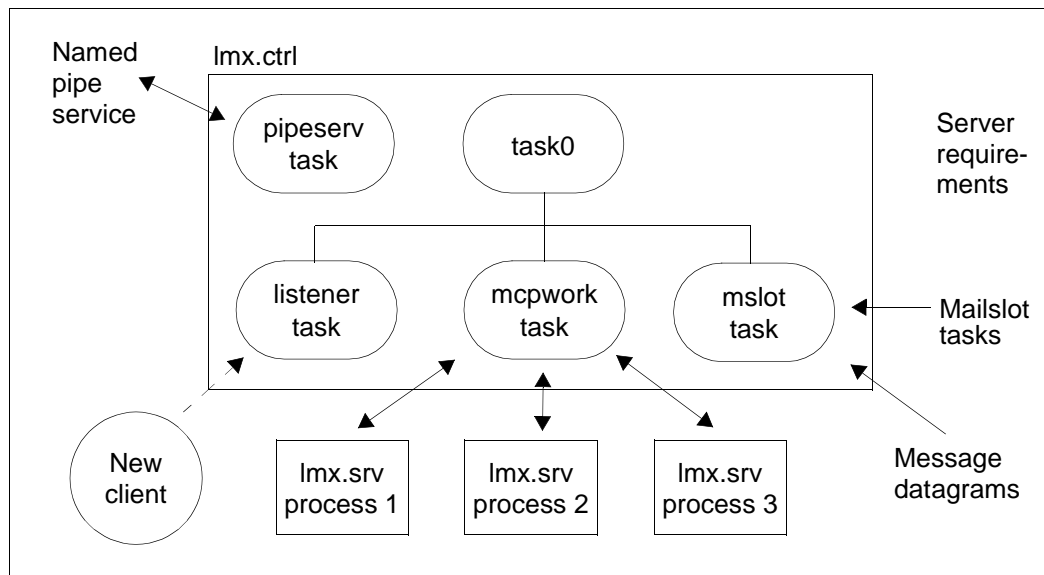| Process	Task
lmx.ctrl	daemon process for connection setup and administrative tasks
lmx.srv	daemon process (generated from the process *lmx.ctrl*) for processing tasks from several workstations
lmx.dmn	daemon process for the service *Netlogon*, for synchronization between different servers *(Single System Image (SSI))*, trust relationships
lmx.alerter	daemon process for alarm messages (Alerter service)
lmx.browser	daemon process for Browser service
lmx.repl	daemon process for the replicator service
lmx.wins	daemon process for Windows Internet Naming Service
lmx.ep	endpoint mapper for RPCs for WINS service
lmx.netrun	daemon process for the Netrun service
lmx.extd	daemon process that works with the SNMP service
lmx.nvalert	daemon process for the Net View Alerter service (not supported by Siemens Advanced Server for UNIX)

The following diagram clarifies the cooperation between Advanced Server for UNIX processes on a server started with the default configuration:
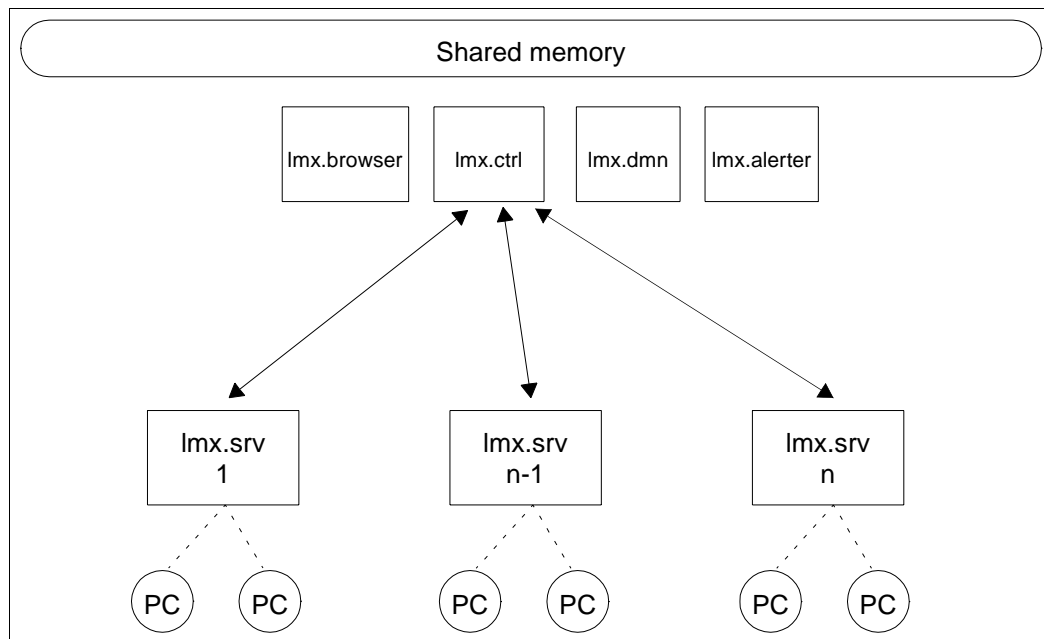
Advanced Server for UNIX processes

The process lmx.ctrl

The process *lmx.ctrl* manages the individual server processes and undertakes those tasks which cannot be directly allocated to a workstation. Several tasks are carried out within the process which are not controlled by the operating system scheduler (as the process is) but which assume control alternately. The individual tasks in the process *lmx.ctrl* are shown in the following diagram:

The process lmx.ctrl

The *task0 task* queries events in the network or in the other processes and gives control of one of the tasks described below to the *lmx.ctrl* process.

The *listener task* reacts to incoming requests from the workstations and distributes the connection requests to the existing server process *lmx.srv* or, if necessary, generates a new server process.

The *mslot task* receives the mailslot requests and passes them on to the server. It also processes the announce requests from other servers. This task transmits the mailslot messages to the application processes on the server, which can then be read using the API function *DosReadMailslot*. In addition, this task manages the server function *autodisconnect*.

The *mcpwork Task* oversees all *lmx.srv* processes and answers administrative queries from the workstations.

The *pipeserv Task* coordinates transactions between server and client applications.

The process lmx.srv

One or more *lmx.srv* processes process the requests of several workstations in the network. Each *lmx.srv* process is started, as required, using the process *lmx.ctrl*. The relevant *lmx.srv* process passes the print requests and their management on to the system spooler.

The maximum number of workstations to be operated in parallel can be configured for the *lmx.srv* process in *lanman.ini* file and in the registry. The minimum and maximum number depend on the parameters *maxclients* (in *lanman.ini*), *MaxVCs* (Registry) and *VCDistribution* (Registry). The Registry parameters *MinVCPerProc*, *MaxVCPerProc* and *VCDistribution* should be used to change the maximum number.

The process lmx.dmn

The daemon process *lmx.dmn* performs the service *network logon security*. It also synchronizes the individual servers *(single system image, SSI)* and is used for trust relationships. This process is started by the process *lmx.ctrl* when Advanced Server for UNIX is being initialized.

The lmx.alerter process

This daemon process manages the alerter function. If not disabled, it is started automatically when AS/X is started.

The lmx.browser process

This process enables the Browser service. If not disabled, this process is started when Advanced Server for UNIX is being initialized.

The process lmx.repl

The process *lmx.repl* establishes contact with other servers and imports or exports files from and to these servers in order to ensure data consistency. This process is only started if it has been configured.

The lmx.wins process

This process establishes the WINS (Windows Internet Naming Service) service. It is started only when configured.

The lmx.ep process

This process works together with the lmx.wins process. It is started and stopped automatically with WINS.

The lmx.netrun process

This process provides the Netrun service: UNIX programs can be executed on the server from MS-DOS or OS/2 workstations using this process.

The process lmx.extd

The *lmx.extd* program is installed and configured with the installation of the software package *asxsnmp*. This process sets up the connection between the SNMP service and Advanced Server for UNIX; it informs the SNMP agent when Advanced Server for UNIX starts and stops.

The lmx.nvalert process

This process is not supported by Siemens Advanced Server for UNIX.

3.2   Network communication

A workstation and an Advanced Server for UNIX communicate in the network using several protocol layers. NetBIOS is implemented in accordance with RFC1001/2. This NetBIOS implementation is based on the standard protocol TCP/IP. The following diagram illustrates the way in which the individual modules work together in the communication process.
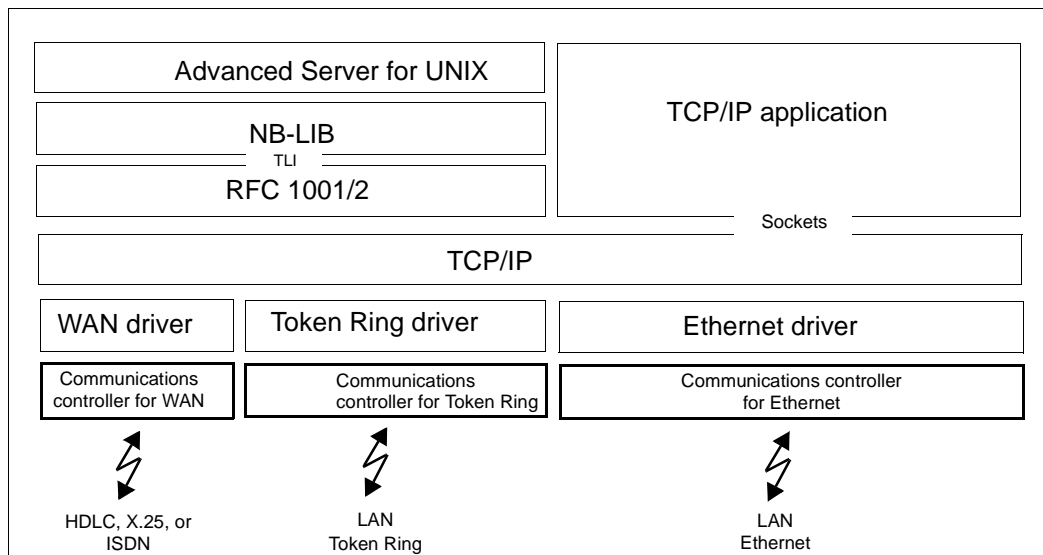
Communication architecture of Advanced Server for UNIX

| i |

- This diagram is a simplified illustration of the communication architecture, other products such as CMX, for example, may be required for communications controllers.

- Depending on the UNIX system implemented
  - there are different connection options
  - communications controllers and card drivers are required
 - several communications controllers can be implemented simultaneously.

The NetBIOS component of the operating system kernel is implemented in the streams architecture. The library NB-Lib in Advanced Server for UNIX allows access to the NetBIOS streams driver using the standard interface TLI. Access to TCP/IP takes place via the NetBIOS streams driver. Parallel access to TCP/IP is possible via the socket interface.

3.3 Local communication for UNIX systems

If a user is working on the server system as an Advanced Server for UNIX user, e.g. administrator, then NetBIOS is used for a local session.

The programming interface to Advanced Server for UNIX, the application programming interface (API), is implemented using local interprocess communication (LIPC). Advanced Server for UNIX processes use the same interface. The requests are mapped to streams pipes in the operating system kernel.
The following diagram shows that the Advanced Server for UNIX processes and the application processes access the same interface:
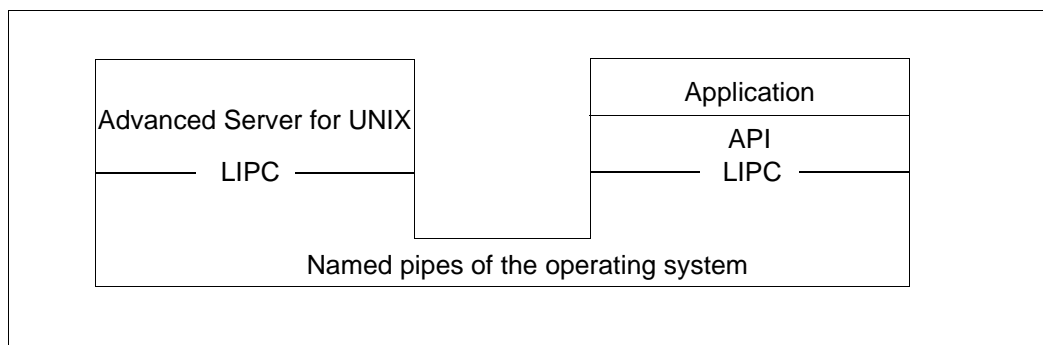
Local communication

The named pipes of the operating system are used for data transport.

4 Installing Advanced Server for UNIX

This chapter contains the information required to install Advanced Server for UNIX. System administrator *root* rights are required for this purpose. In order to configure the server system in accordance with individual requirements after the installation, please read the chapter on "Configuring Advanced Server for UNIX".

i	The Release Notice and most recent information that only became available after this manual went to print, e.g. on the version specifications of required software products and supported hardware, are contained in the *SIreadmeM* package, which is supplied with Advanced Server for UNIX V4.0.

4.1 Advanced Server for UNIX delivery package

All of the software for Advanced Server for UNIX is contained on CD-ROM in package format (PKG). An overview of this is given on the next page.

i	Advanced Server for UNIX Version 4.0 and later is only supplied on CD-ROM. Key diskettes are no longer used for installation.

The following manuals are available for Advanced Server for UNIX, and they can be obtained in various delivery units:

- This manual "Overview and Installation" (German and English)
- "Concepts and Planning" (German and English)
- "API Reference"
- "SNMP Service" (from the series of manuals on LAN Manager/X V2.2)
- "Installation Guide for Clients"
- "User's Guide for MS-DOS Clients"
- "User's Guide for MS Windows Clients"
- "NetWare Connectivity"
- "Installation Guide for Clients" (Supplement to Version 3.0 of MS Network Client)

The following packages are included in the Advanced Server for UNIX delivery package:

- SIreadmeM   Readme file and Release Notice in German and English
- nbrfc   NetBIOS (RFC1001/2)
- asxserver   Server
- asxtools   Microsoft Windows NT Server Tools
- asxtoolsD   Microsoft Windows NT Server Tools (German language)
- msclients   Microsoft Client Software
- asxman   Manual pages for Advanced Server for UNIX
- asxdocs   Online documentation and Acrobat Reader
- asxsnmp   Advanced Server for UNIX SNMP extension for TransView Extensible Agent
- asxdebug   This package is only intended for the Siemens Support Service.

4.2 Hardware and software requirements

Before installation users must check that the following hardware and software requirements are met.

4.2.1 Hardware requirements

One of the following UNIX systems that is connected to a LAN is required for the installation of Advanced Server for UNIX:

- RM200
- RM300
- RM400
- RM600-xxx

4.2.1.1 Main memory

At least 64 Mbytes of main memory is required, 128 Mbytes is recommended.

4.2.1.2 Hard disk storage

The file systems must have the following available disk space for Advanced Server for UNIX at installation time:

File system	Min. number in Mbytes	Comment
/	6-10	For the new kernel
/usr	<1	For the *asxserver* package
/usr	2	For the *asxman* package
/usr	< 1	For the *asxsnmp* package
/var	20	
/opt	< 1	
Any file system	20	For the *asxtools* package
Any file system	21	For the *asxtoolsD* package
Any file system	20	For the *msclients* package
Any file system	21	For the *asxdocs* package

In addition, sufficient space must be reserved for the shared directories and the replicator files and directories.

The server software is installed under the */var/opt/lanman* directory. If a different file system (e.g. /<*new_dir*>) is required, the following commands must be executed **before** installation:

```
mkdir /var/opt
mkdir /new_dir/lanman
ln -s /new_dir/lanman /var/opt/lanman
```

i
- The names of the file systems and the size of available memory can be viewed using the *df -v* or *dfspace* command.

- The installation procedure also requires free disk space under the */var* directory during installation from CD-ROM.

⚠
- Likewise, please note that the Advanced Server for UNIX databases also require free disk space under the */var* directory (in large configurations approx. 50 Mbyte is not unusual).

4.2.2 Software requirements

The software listed below must be installed on the server system in order to run
Advanced Server for UNIX:

System	software version
RM200	Reliant UNIX-N V5.43C0 and later
RM300	Reliant UNIX-N V5.43C0 and later
RM400	Reliant UNIX-N V5.43C0 and later
RM600-xxx	Reliant UNIX-Y V5.43C0 and later

If you would like to use the "shared printer" resource with Advanced Server for UNIX, you
must configure one of the following spoolers **before** installing Advanced Server for UNIX:

Product name	Meaning
AT&T spooler	Standard spooler
SPOOL V4.2B or Xprint 5.0 (and later)	Siemens Spooler package

The following software package must be installed **before** installing Advanced Server for
UNIX:

Product name	Meaning
CDS++RTS V1.0B00 (and later)	Reliant UNIX C++ Runtime system

When the WINS Service is to be used then one of the following software packages must be
installed **before** installing Advanced Server for UNIX:

Product name	Meaning
DCE-THR V2.0A20 (or later)	from the CD-SYS-MI from 8/97
SIthreads	delivered with the operating system

⚠ This package is only necessary if the machine should run the Advanced Server for
UNIX WINS service.

The "SIthreads" package is included on the operating system CD with more recent
operating system versions. This package replaces the previous version
"DCE-THR". In this case, you should only use the "SIthreads" package.

4.2.2.1 Dependencies

You can use Advanced Server for UNIX from clients if one of the client software products described in section "Client software" is installed on them.

4.3 The installation procedure

The software is installed from the CD-ROM using the *cdinst* utility. *cdinst* invokes the *pkgadd* program implicitly. You should proceed as follows:

1. Deinstall LAN Manager/X V2.0, V2.2, V3.5 or V4.0 if they exist.

2. Install the *SIreadmeM* package with the release information and important information **first**.

3. **Then** install NetBIOS and restart the system.

4. The server software of Advanced Server for UNIX can be installed **now**. There are different installation steps for the
   – upgrade installation of Advanced Server for UNIX from previous versions and the
   – new installation of Advanced Server for UNIX.

5. You can now install the optional Advanced Server for UNIX software.

> **i**   If you do not follow this sequence, installation cannot be carried out successfully for, for instance, the server role backup domain controller.

During installation, you must specify the name of the device from which the software is to be installed. The device name of the CD-ROM drive depends on the UNIX system used. For further information, please refer to the UNIX reference manual "Commands – Volume 1 and 2".

4.4 Deinstalling previous versions

Before this version of Advanced Server for UNIX V4.0 is installed, the previous versions must be deinstalled. You must follow the sequence for deinstallation described here in a domain with a primary and one or more backup domain controllers.

| **i** | ● The LAN Manager/X server roles 'member server' and 'standalone server' are not supported by Advanced Server for UNIX. |

● A member server should be handled in the same way as a backup domain controller.

● A standalone server should be handled in the same way as a primary domain controller.

● A LAN Manager/X server can never be the Primary Domain Controller in a domain with NT servers or computers running Advanced Server for UNIX.

1. Stop the primary domain controller.

2. Deinstall LAN Manager/X or Advanced Server for UNIX.

3. Then install Advanced Server for UNIX **as the primary domain controller.**

If individual backup domain controllers are to continue being operated with the new Advanced Server for UNIX version, carry out the following steps:

1. Stop the backup domain controller.

2. Deinstall LAN Manager/X or Advanced Server for UNIX.

3. Then install Advanced Server for UNIX **as the backup domain controller**.

| **i** | The primary domain controller must be running. |

4.4.1   Deinstalling LAN Manager/X V2.0 and V2.2

You can continue to use the existing server configuration for the new version.

⚠   ● With Version 2.0 of LAN Manager/X the logon scripts of the LAN Manager/X
       user are not backed up automatically when the software is deleted.

    ● When the NetBIOS of Version 2.0 under Reliant UNIX-N is deinstalled, the
       /etc/default/inet file is deleted illegally.

The following steps must be carried out **before deinstalling** LAN Manager/X V2.0:

▶   To back up the logon scripts, copy all files under the */var/opt/lanman/repl/export/scripts*
    directory (on the export server) or */var/opt/lanman/repl/import/scripts* (on the import
    server) to **another** directory in the file system – **not to** */var/opt/lanman*.

    If you do not want to modify the server roles and if you are using the replicator service,
    you only need to back up the logon scripts for the export server.

▶   If you are working under Reliant UNIX-N, back up the */etc/default/inet* file, to
    /etc/default/inet.org for example, **before** executing the *pkgrm nbrfc* command.

When deinstalling, you have the option to back up the logon scripts for Version 2.2 and later
of LAN Manager/X.

The following steps are required for deinstalling both versions:

▶   Delete LAN Manager/X V2.0 or LAN Manager/X V2.2 as documented.

    Deinstall the server software and NetBIOS of Versions 2.0 or 2.2. During deinstallation
    you are given the options of backing up the *lanman.ini* file, the user account etc. and to
    continue using them for Version 4.0. For further information on deinstalling Version 3.5,
    LAN Manager/X V2.0 or 2.2 please refer to the "Overview and Installation" manual for
    the relevant version.

i   ● The */var/opt/lanman/lanman.ini* and */var/opt/lanman/datafiles/accounts.lmx* files
           must be backed up for an upgrade from LAN Manager/X V2.0 or V2.2 to
           Advanced Server for UNIX V4.0.

        ● If you want to install Version 4.0 after deinstalling Version 2.0 or 2.2 of NetBIOS,
           you do not need to restart the system now.

▶   Install Advanced Server for UNIX V4.0 as described on the following pages.

i   The standard logon scripts *netlogon.bat* and *netlogon.cmd* are recreated during instal-
        lation of Advanced Server for UNIX.

▶   If you deinstalled LAN Manager/X V2.0 beforehand, copy the backed up logon scripts
    back to */var/opt/lanman/repl/export/scripts* (on the export server) or to
    /var/opt/lanman/repl/import/scripts (on the import server).

► If you deinstalled LAN Manager/X V2.0 under Reliant UNIX-N, copy the
  /etc/default/inet.org file – backed up as described above – back to */etc/default/inet*.

4.4.2 Deinstalling Advanced Server for UNIX V3.5

You can continue to use the existing server configuration for the new version.

You should proceed as follows:

► Stop Advanced Server for UNIX

► Check the databases. This will save time during the upgrade installation if the
  databases are corrupt.
  Call */var/opt/lanman/bin/acladm -C -y* and */var/opt/lanman/bin/samcheck -r* to check and
  repair the acl database and the account databases.

► Remove Advanced Server for UNIX V3.5 as described in the manual for the respective
  version.

► Deinstall the optional packages including optional Service Packs, the server software,
  and NetBIOS. When you are deinstalling you will be offered the option of saving the
  lanman.ini file, the user account etc. and using them for the new version. For further
  information on deinstalling Advanced Server for UNIX please refer to the "Overview and
  Installation" manual for the respective version to be deinstalled.

► If you want to install the new version after NetBIOS has been deinstalled, you do not
  need to restart the system.

Special features of NetBIOS configuration:

The following applies only if you had previously installed a NetBIOS Version 3.5A.

The NetBIOS Version 3.5A */var/opt/nbrfc/nbrfc.cfg* configuration file is copied to */tmp* when
the *nbrfc* package is deleted, and can then be saved. The reinstallation of NetBIOS Version
3.5B and later is based on a new configuration file structure. It is not possible to automati-
cally retain the old interface configuration, but you can convert old NetBIOS name
mappings into the new configuration file structure.

The following options are available:

To ignore old name mappings:

► Install the *nbrfc* package without regard for the old *nbrfc.cfg* file. You will then find a new
  configuration with the configuration files under */var/opt/nbrfc/conf*. All network interfaces
  found are configured automatically in the *interfaces.cfg* file.

To automatically convert old name mappings:

► Prior to installation, create the directory */var/opt/nbrfc*, with owner *root*, group *bin*, and permissions *755*.

► Copy the saved *nbrfc.cfg* file to this directory.

► Install the new *nbrfc* package. If there is a name table available in the *[NBRFC]* section of the old *nbrfc.cfg* file, it is transferred automatically to the *names.cfg* file.

To manually convert old name mappings:

► Install the *nbrfc* package.

► Copy the saved *nbrfc.cfg* file to the */var/opt/nbrfc* directory.

► Use the */var/opt/nbrfc/bin/mv_names* command. If there is a name table available in the *[NBRFC]* section of the old *nbrfc.cfg* file, it is transferred automatically to the *names.cfg* file. Please refer to the description in section "/var/opt/nbrfc/bin/mv_names".

> **i**   In any case the network interface configuration must be compared visually with the interface sections of the old *nbrfc.cfg* file. Please retain the new keyword "default".

For further information on the new configuration files, please refer to section "Configuring NetBIOS".

4.5 Automatic installation with TransView SAX

All packages of Advanced Server for UNIX can be distributed with TransView SAX and installed automatically with a response file. Later versions of Advanced Server for UNIX can also be installed with TransView SAX as delta products.

> **i**   It is not possible to upgrade from LAN Manager/X with a delta installation.

4.6 Installing from CD-ROM with cdinst

Advanced Server for UNIX is only supplied on CD-ROM. The first steps for installation with the *cdinst* program are the same for all packages and are thus described here centrally. The other installation steps for the individual packages are given at the end of this section.

Carry out the following steps in the specified sequence:

1. Log on as system administrator *root* and insert the CD into the drive of the system from which you want to carry out the installation.

   You can initiate the installation procedure from the UNIX command prompt.

2. Start the installation program with *cdinst*. The following dialog box is displayed:

```
      1                                Process Multi-Product CD-ROM

  Server:               local
  CD-ROM device name:   /dev/ios0/sdisk005s0
  Remote pathname/
  Local mountpoint:      /cdrom0

  Fill in the form and then press SAVE.
```

   ▶ Place the cursor on *CD-ROM device name* and select the device name for the CD-ROM drive with ⌈ F2 ⌋ (*CHOICES*). Then select ⌈ F3 ⌋ (*SAVE*) to confirm your input. A general message about the volume is then displayed.

   ▶ Acknowledge with ⌈ F8 ⌋ (*CONTINUE*).

3. Mark the *ASX* set in the displayed list with the cursor and then press ⌈ F2 ⌋ (*MARK*) and ⌈ F3 ⌋ (*ENTER*). The following message is then displayed:

```
   2

  info              - Display Detailed Product Information
  pkginfo           - Display Detailed Information on Packages
  README            - Display README Files
  install           - Install Products

  Move the cursor to the item you want and press ENTER to
  select it.
```

   ▶ Select *info* to display other information on the Advanced Server for UNIX V4.0 product, e.g. the name of the manufacturer, date of manufacture, version etc. ⌈ F6 ⌋ (*CANCEL*) returns you to the displayed selection.

▶ Select *pkginfo* to display more details on individual packages, e.g. number of files or memory requirements. ⌐F6⌐ (*CANCEL*) returns you to the displayed selection.

▶ Select *README* to display a list of the readme files for the Advanced Server for UNIX product. ⌐F6⌐ (*CANCEL*) returns you to the displayed selection.

4. Select *install* and then press ⌐F2⌐ (*MARK*) and ⌐F3⌐ (*ENTER*) to begin installation of the individual packages.

```
┌─ 4                    Install                              ─┐
│                                                            │
│ Install:                              Package              │
│ Installation mode:                    dialog               │
│ Installation default file name:       default              │
│ Path to response files:               /tmp/16632/response  │
│                                                            │
│  Fill in the form and then press SAVE.                     │
│                                                            │
└────────────────────────────────────────────────────────────┘
```

In the *Install* selection field you can choose between *Complete Product*, *SIreadmeM*, and *Package*. To confirm your selection, press ⌐F2⌐ (*CHOICES*).

⚠ Do not select Complete Product. If you select this, installation will fail.

▶ Select *SIreadmeM* or *Package*.

The selection field *Installation mode* provides a choice between *automatic* and *dialog* via ⌐F2⌐ (*CHOICES*).

▶ Select the installation mode *dialog*. For information on how to install the *asxserver*, *asxtools*, *asxtoolsD*, *asxdocs,* and *msclients* packages with the default configuration **without further** input, please refer to the section "Installing with the default configuration". The other packages do not require any further input during installation.

▶ Press ⌐F3⌐ (*SAVE*).

5. If you select *Package*, the following selection is displayed (for contents of the packages, please refer to section "Advanced Server for UNIX delivery package"):

```
  5      4.0 Packages
 AS/X 4.0<version>  SIreadmeM
 AS/X 4.0<version>  nbrfc
 AS/X 4.0<version>  asxserver

 AS/X 4.0<version>  asxtools
 AS/X 4.0<version>  asxtoolsD
 AS/X 4.0<version>  msclients
 AS/X 4.0<version>  asxman
 AS/X 4.0<version>  asxdocs
 AS/X 4.0<version>  asxsnmp
 AS/X 4.0<version>  asxdebug

 Mark the items you want and press ENTER to select them.
```

▶   Use the cursor to select the required package and press ⎡ F2 ⎤ (*MARK)*, then start installation with ⎡ F3 ⎤ (*ENTER*).

The *pkgadd* program is thus called implicitly.

▶   Carry out the other installation steps as they are described in the following paragraphs.

⚠   Install the packages in the following (mandatory) sequence:

1. SIreadmeM

2. nbrfc: Once you have successfully installed the *nbrfc* package for NetBIOS, reboot the system.

3. asxserver

6. The following packages are optional and can be installed in any sequence:

–   asxdocs
–   asxman
–   asxtools
–   asxtoolsD
–   msclients
–   asxsnmp

For further information on the optional packages, please refer to the section "Installing optional packages".

ℹ   From this point on, the individual packages are installed via *pkgadd*.

4.7 Installing the prerequisited packages

Install the following before the actual server software:

● SIreadmeM package

● NetBIOS

| **i** | Please observe the specified installation sequence here. |

4.7.1 Installing the SIreadmeM package

Install the *SIreadmeM* package **first**. The package contains README files in German and English. These contain information that became available after this manual went to print.

Install the *SIreadmeM* with the following steps:

► Log on to the system console as system administrator *root*.

► Carry out the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Then, under *AS/X* select the package called *SIreadmeM*. The system now copies the German files from the volume to */opt/readme/asx.D* and the English files to */opt/readme/asx.GB*.

| **i** | Please observe the information in these files for the next steps. |

The README files are always located under this path. The manual page files are numbered consecutively, e.g. the first file for Advanced Server for UNIX V4.0 is stored in the path */opt/readme/asx.D/man400*. Since the package is a general UNIX package which is used by different products, the package cannot be removed again.

4.7.2 Installing NetBIOS

| ⚠ | To be able to use the WINS Service functionality NetBIOS Version 4.0A00 or later has to be installed. When installing the AS/X package *asxserver* a warning will appear if the correct version is not present. |

| ⚠ | To be able to be use the DNS-WINS integration functionality that is provided with Reliant UNIX V5.45, NetBIOS Version 4.0B or later has to be installed. |

The Advanced Server for UNIX package *nbrfc* with NetBIOS must be installed **first**. As, in certain cases, Advanced Server for UNIX establishes contact with other servers when installing the server software, NetBIOS must be available in advance.

In the case of multiprocessor systems the parallel NetBIOS is installed automatically, which increases performance.

⚠️ Please deinstall the previous version of LAN Manager/X or Advanced Server for UNIX.

A new UNIX kernel is generated during installation; the file *mtune* is modified here.

Now install NetBIOS, working through the following steps:

► Log on to the system console as system administrator *root*.

► Start installation with the *cdinst* command and carry out the first steps as described in the section "Installing from CD-ROM with cdinst".

► Select *nbrfc* for the NetBIOS software from the selection list for the packages.

⚠️ ● Do **not** under any circumstances select the option *Complete Product* if you are installing using *cdinst*.

● The *nbrfc* package must be installed **before the rest** of the software.

The system will now copy the files from the data medium, set up NetBIOS for **all** network controllers in the system automatically, and generate a new UNIX kernel. This process will be displayed on the screen, though it may take a little time.

The configuration data is stored in the */var/opt/nbrfc/conf/interfaces.cfg* file during installation. If a file already exists, it will not be overwritten.

If you are installing a backup domain controller, the local machine will need to be able to find the primary domain controller during installation of the *asxserver* package. Therefore, **if** you are installing a backup domain controller **and** the primary controller of the domain you want to join is located in a different subnet, you have to ensure that the domain name and the server name can be resolved by the local NetBIOS. This can be accomplished in the following ways:

To ensure that the primary domain controller can be found if WINS is not used:

► If the file *names.cfg* in the directory */var/opt/nbrfc/conf* does not exist, create it by copying the *names.sam* file in the same directory.

► Edit the *names.cfg* file and manually add two lines containing NetBIOS-name-to-IP-address mappings:

Example entries in *names.cfg:*

```
# My primary domain controller
mypdc        144.145.101.10  UN
# The domain I want to join
mypdc.dom    144.145.101.10  UN #1b
```

| **i** | Note that both the server name ("mypdc") and the domain name ("mypdc.dom") must be given together with the server's IP address. |

or (as an alternative):

► Edit the file */var/opt/nbrfc/conf/interfaces.cfg* and configure the IP address of the primary controller's subnet in the appropriate interface section using the parameter "brdcast_list=":

Example entry in *interfaces.cfg*:

```
[et0]
        active=yes
        used_by_wins=yes
        ip_addr=default
        brdcast_addr=default
# Subnet address of my primary domain controller:

        brdcast_list=144.145.101.255
        netmask=default
```

| **i** | If the brdcast_list line is commented out (default), do not forget to uncomment the line! |

To ensure that the primary domain controller can be found if this server is a WINS client:

► Edit the file */var/opt/nbrfc/conf/wins.cfg* and add the appropriate WINS server addresses.

For detailed information on configuring name resolution, refer to section "Configuring NetBIOS Name Resolution".

| **i** | In any case, you should now reboot the system before proceeding with the installation of the server software. |

4.8　Installing server software (asxserver package)

> **i** The following software package has to be installed before installing Advanced Server for UNIX:

Product name	Meaning
CDS++RTS V1.0B00 (or later)	Reliant UNIX C++ Runtime system

> **i** If you want to use the WINS service then one of the following packages has to be installed before installing Advanced Server for UNIX:

Product name	Meaning
DCE-THR V2.0A20 (or later) SIthreads	from the CD-SYS-MI from 8/97 delivered with the operating system

> ⚠ This package is only necessary if the machine should run the Advanced Server for UNIX WINS service.
>
> The "SIthreads" package is included on the operating system CD with more recent operating system versions. This package replaces the previous version "DCE-THR". In this case, you should only use the "SIthreads" package.

4.8.1　Preparing the installation

If the servers of the domain are distributed over several subnetworks, ensure that NetBIOS can resolve the names. For details on configuring NetBIOS name resolution, please refer to the section "Configuring NetBIOS Name Resolution".

The individual installation steps depend on whether you are carrying out an upgrade installation from a previous version or a new installation. Furthermore, the installation requirements and steps differ depending on the server role required.

In the case of an upgrade installation, as many configuration information as possible is automatically incorporated from the previous version. Although it is possible to deinstall the previous version with the option of saving only a part of the data, it is recommended to save all configuration data.

⚠ Before you upgrade Advanced Server for UNIX, it is strongly recommended that you back up the contents of the *var/opt/lanman* directory after the deinstallation.

First a general description of the installation steps is given.

Afterwards, the following installations are described separately:

● Upgrade installation of a primary domain controller from Version 2.x

● Upgrade installation of a backup domain controller from Version 2.x

● Upgrade installation of a primary domain controller from Version 3.5 or 4.0

● Upgrade installation of a backup domain controller from Version 3.5 or 4.0

● New installation of a primary domain controller

● New installation of a backup domain controller

4.8.1.1 Installation steps

Before starting the installation, be prepared to answer the following questions.

Remember you can change your selections after the server installation process is complete.

Stop the server

You are first asked if you want to stop the server if it is running.

This is for security reasons only, because the installation cannot continue if the server is running.

The installation will abort if the server is running and you do not choose to stop the server.

Because this happens very early during installation, this question is asked every time regardless of the actual system configuration.

Interactive or non-interactive installation

There are two ways to install Advanced Server for UNIX:

1. Select *interactive* if the required data is to be input **during** installation. This is the recommended installation mode for installations via *cdinst*.

2. Select *non-interactive* if the required data is to be input **before** installation, but if the default configuration should not be used. The input entered before installation will be stored in a response file that can be used for installations with no user interaction. This installation mode is only used for special configurations and it is not described here.

You can start the *non-interactive* installation with a **default configuration**. With this installation type, no further input is required before and during installation. Using this method, the server is always installed as a primary domain controller in it's own domain. For further information, please refer to the section "Installing with the default configuration".

The steps for interactive installation are presented on the following pages.

Normally you will choose this installation.

Output language

The *output language* configuration is used to specify the output language of the UNIX commands *net* and *elfread* and of the Windows Administrative Tool *EventViewer*.

The *output language* does **not** affect the builtin names of Advanced Server for UNIX objects as *domain language* does (see below).

The *output language* has to be specified during all installation types.

Please refer to the chapter entitled "Administration guidelines" for further information on how to change the output language after installation.

Interface name of the spooler used by the server

Establish which spooler your system will use and specify this during installation.

Check whether the spooler you are going to specify has been configured in UNIX and is started.

If the spooler has not been started during installation, you will receive a warning message.

The spooler has to be configured during all installation types.

During installation of the server software, the printer devices *lmxnul* and *lmxnone* are created for internal use.

| i | These printer devices **cannot be deleted** and **cannot be used** for printing from the UNIX shell. |

Please refer to the chapter entitled "Administration guidelines" for further information on how to change the spooler after installation.

Server name

Every Advanced Server for UNIX needs a unique server name.

During a new installation, the installation program constructs a server name from the system name. The suggested name can be accepted or replaced by another name consisting of up to 15 characters. Please refer to the chapter entitled "Introduction to Advanced Server for UNIX" for information on the naming conventions for server names.

In order not to run into problems when upgrading to upcoming NT/AS/X-versions in the future, all tools requesting a server name during installation or reconfiguration offer the DNS-compatible host name ('uname -n') as the default server name. The extension *.srv* can still be used, but is not recommended and no longer offered as a default. Installation/config-uration scripts now inform the administrator about DNS-incompatible server names.

During an upgrade installation, the server name is retained from the previous version, if possible.

⚠ The server name must not be modified manually in the lanman.ini file or in the Advanced Server Registry under any circumstances.

Please refer to the chapter entitled "Administration guidelines" for further infor-mation on how to change the server name after installation.

Server role

During a new installation, the role of the server has to be specified.

In a domain there is exactly one primary domain controller. The primary domain controller must be the first server that is installed in a domain. Other LM/X and AS/X servers can be backup domain controllers.

If you do a new installation of a server as a primary domain controller in a domain that already exists, the result will be two domains with the same name, neither of which will operate properly.

Note that a LAN Manager/X server can never be a primary domain controller in a domain with Windows NT servers or Advanced Server for UNIX servers. After the upgrade of the primary domain controller, all other LAN Manager/X servers, Advanced Server for UNIX servers and Windows NT servers can still be used without having adopted. Please plan your upgrade order accordingly.

In the case of an upgrade installation, the server role is automatically incorporated from the previous installation, if possible.

LAN Manager/X servers offer four types of server roles: primary domain controller, backup domain controller, member server and standalone server.

The server roles "member server" and "standalone server" are no longer supported with all Advanced Server for UNIX versions.

The server role "member server" becomes backup domain controller, and the "standalone server" becomes primary domain controller.

Please refer to the chapter entitled "Administration guidelines" for further information on how to change the server role after installation.

Domain name

During installation, the server is automatically allocated to a domain. Please refer to the chapter entitled "Introduction to Advanced Server for UNIX" for information on the naming conventions for domain names.

In the case of an upgrade installation, the domain name is automatically incorporated from the previous installation, if possible.

> ⚠️ The domain name **must not** be modified manually in lanman.ini **under any circumstances**.
>
> Please refer to the chapter entitled "Administration guidelines" for further information on how to change the domain name after installation.

Name of the primary domain controller

If you wish to install a new backup domain controller, you will be asked to enter the server name of the primary domain controller.

Name of the administrator

During the new installation of a primary domain controller, the builtin account *Administrator* is created automatically.

During any installation of a primary domain controller, this account is used for all administration tasks during the installation.

For security reason, other administrative accounts may have been created on the primary domain controller with different names. During the installation of a backup domain controller, you will be asked to enter the name of an administrative account.

Administrator's password

During the installation of a primary domain controller, the password for the builtin user *Administrator* is set.

During the installation of a backup domain controller, you will be asked to enter the password for an administrative account of the primary domain controller.

The password has to be entered twice to avoid errors. The passwords are not displayed on the screen as they are typed.

Domain language

The term *domain language* is used whenever the language of builtin objects is referenced (e.g. the object *Everyone* showed when *domain language* is set to *ENGLISH* corresponds to *Jeder* in an environment with *domain language* set to *GERMAN*).

The *domain language* of a domain is always dependent on the *domain language* of the primary domain controller of that domain.

⚠ In a domain with "mixed" language various problems can occur.
It is **not** recommended to do that!

With AS/X 3.5 it was not possible to change the domain language, english was always used. So it could happen that AS/X 3.5 was an english backup domain controller in a german Windows NT domain. You should use *joindomain* to "repair" your domain.

The *domain language* of a primary domain controller is evaluated when the databases of the primary domain controller are initialized. Changing the *domain language* has no effect without re-initializing those databases (re-initialization means loss of all created users and groups).

The customer is recommended to use *joindomain* to do a new initialization of the database. Everytime *joindomain* is going to create a new database, you can specify the *domain language*.

To prevent the loss of user and group information the installation only asks for the *domain language* if there are no existing databases or if the existing databases cannot be used. (Keep in mind that during the preparation of an unattended installation the question is asked to have the setting on the target machine.)

If you upgrade an Advanced Server for UNIX V3.5 (primary or backup domain controller), the databases are upgraded from the older version, there is no new initialization to prevent loss of exisiting users and groups.
That's why the *domain language* cannot be entered. The internal setting of the *domain language* will be default *ENGLISH*.

If you install an Advanced Server for UNIX V4.0 primary domain controller from scratch or upgrade a LAN Manager/X to be an Advanced Server for UNIX primary domain controller, you can select the *domain language* for the domain. All builtin objects are initialized using the selected *domain language*.

If you install an Advanced Server for UNIX V4.0 backup domain controller from scratch or upgrade a LAN Manager/X to be an Advanced Server for UNIX backup domain controller you should select the same *domain language* as on the primary domain controller to prevent trouble managing objects in that domain.

During an upgrade installation it could happen that a database cannot be upgraded because it is too corrupt to repair. In this very special situation it must be re-initialized with a new *domain language*.

To change the output language of commands see *Output language.*

Please refer to the chapter entitled "Administration guidelines" for further information on how to change the domain language after installation.

Windows NT-style Printing

One of the new features in Advanced Server for UNIX Version 4.0 is Windows NT-style printing.

This feature means that you can manage Advanced Server for UNIX print operations in the same way as Windows NT. Advanced Server computers can store printer drivers for Windows NT and Windows 95/98 client computers on the server. Printer drivers are downloaded automatically from the server to Windows 95/98 and Windows NT client computers. These clients then can use the server's printers without loading printer drivers manually.

However, Windows NT-style Printing requires that the administrator updates each printer share with the appropriate printer driver(s) before Windows NT client computers will be able to use this server's printers.

⚠ If you don't disable Windows NT-style printing, your Windows NT client computers will not be able to print until you administer each printer share that these clients will use.

Only Windows NT client computers are affected. This is not required for Windows 95/98 or any other type of Microsoft network clients; they will continue to work as before.

Start the server

You can start the server directly during the installation or manually after the installation.

Note that after having installed a new NetBIOS, the system must have been rebooted before you can start the server.

The upgrade installation from Version 2.x needs a running server to convert the old databases into the Advanced Server for UNIX databases automatically. Further information can be found in the description of the upgrade installation from Version 2.x.

4.8.2 Upgrade installation of a primary domain controller from Version 2.x

For the upgrade installation of a primary domain controller, proceed as described below.

Data backed up from LAN Manager/X Version 2.x (e.g. user account) is taken over.

If the servers of the domain are distributed over several subnetworks, ensure that NetBIOS can resolve the names. For details on configuring NetBIOS name resolution, please refer to the section "Configuring NetBIOS Name Resolution".

► Log on as system administrator *root*.

► Start the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxserver* package under AS/X.

► Stop the server.

► Choose *y* to stop the server.

Interactive or non-interactive installation

► Choose *interactive* for interactive installation.

The following description applies for interactive installation.

The system now copies the files from the installation medium and sets up specific users and user groups for Advanced Server for UNIX.

Output language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

► Enter the output language.

Interface name of the spooler used by the server

The system now displays all configurable spoolers and outputs the message

```
Please enter the interface name or press ENTER if it is <spool interface>:
```

▶   Enter the interface name of the spooler.

Server name

The server name is incorporated from the previous version, if possible.

Server role

The server role is incorporated from the previous version, if possible.

Domain name

The domain name is incorporated from the previous version, if possible.

Name of the administrator

On a primary domain controller, the builtin administrative account *Administrator* is always used. During an upgrade installation from Version 2.x, the account *Admin* is mapped to *Administrator* automatically.

Administrator's password

The password of the account *Administrator* has to be set manually.

Domain Language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

▶   Enter the domain language.

Windows NT-style Printing

When there have been shared printers from a previous installation, you now have to decide how to upgrade these printers.

The system displays some information and the message

```
You can choose to disable Windows NT-style printing and allow Windows NT
client computers to print without first administering each print share on
this server. You can enable this feature at any time in the future.

Do you want to disable Windows NT-style printing [y/n]?
```

▶ Enter your selection.

Start the server

To complete the upgrade installation, the saved LAN Manager/X datafiles must now be adapted.

For this purpose, the primary domain controller must be started. The system provides you with the option of starting the server immediately with the message

```
NOTICE: To upgrade the saved data from LM/X 2.x you have to start the server!
Do you want to start the Advanced Server [y/n]?
```

▶ Enter *y* to start the server during the installation, or *n* to start it manually after the installation.

Upgrade of the accounts database (*lmxupgrade*)

If you have started the server, the upgrade is executed automatically and the output of the command *lmxupgrade* is written to the screen and the file
/var/opt/lanman/logs/lmxupgrade.log.

If the server is not started, the following message gives you information on how to upgrade later:

```
Access Control Entries, user accounts and groups can be upgraded from the
LAN Manager 2.x accounts file (/var/opt/lanman/accounts.lm2).
Make sure the Advanced Server for UNIX is running and then manually run
lmxupgrade -UGA ... .
```

In this case, the administration files must be adjusted **after** Advanced Server for UNIX has been started:

▶ start AS/X with *asx start*

► call */var/opt/lanman/bin/lmxupgrade -YUGA*

Watch the output of the command for files and directories which are not found for upgrading access permissions

Note that the guest account will be set to state "inactive" during the upgrade.

4.8.3 Upgrade installation of a backup domain controller from Version 2.x

Ensure that the primary domain controller (Advanced Server for UNIX or Windows NT server) of this domain has been started.

If the primary domain controller of the domain you want to join is located in a different subnet, you have to ensure that the domain name and the server name of the primary domain controller can be resolved by the local NetBIOS. Please refer to the section "Installing NetBIOS" on how to accomplish this.

For the upgrade installation of a backup domain controller, proceed as follows.

► Log on as system administrator *root*.

► Start the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxserver* package under AS/X.

Stop the server

► Choose *y* to stop the server.

Interactive or non-interactive installation

► Choose *interactive* for interactive installation.

The following description applies for interactive installation.

The system now copies the files from the installation medium and sets up specific users and user groups for Advanced Server for UNIX.

Output language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

► Enter the output language.

Interface name of the spooler used by the server

The system now displays all configurable spoolers and outputs the message

```
Please enter the interface name or press ENTER if it is <spool interface>:
```

▶   Enter the interface name of the spooler.

Server name

The server name is incorporated from the previous version, if possible.

Server role

The server role is incorporated from the previous version, if possible.

Domain name

The domain name is incorporated from the previous version, if possible.

Name of the primary domain controller

The name of the old primay domain controller must be confirmed here.

```
Enter the name of the primay domain controller
or press Enter to select '<old primary name>':
```

Name of the administrator

The name of an administrative account on the primary domain controller must be entered here.

```
Enter the name of an administrative account on '<primary name>'
or press Enter to select 'administrator':
```

Administrator's password

▶   Enter the password for the administrator twice:

```
Enter the password for administrator:
Re-enter password:
```

Domain Language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

▶   Enter the domain language of the primary domain controller.

Windows NT-style Printing

When there have been shared printers from a previous installation, you now have to decide how to upgrade these printers.

The system displays some information and the message

```
You can choose to disable Windows NT-style printing and allow Windows NT
client computers to print without first administering each print share on
this server. You can enable this feature at any time in the future.

Do you want to disable Windows NT-style printing [y/n]?
```

▶   Enter your selection.

Start the server

To complete the upgrade installation, the saved access permissions must be transferred from the previous version. The account data (the users and groups) is transferred automatically from the primary domain controller. To do this, the backup domain controller must set up a connection with the primary domain controller.

For this purpose, both the primary domain controller and the backup domain controller must be started. The system provides you with the option of starting the server immediately with the message

```
NOTICE: To upgrade the saved data from LM/X 2.x you have to start the server!
Do you want to start the Advanced Server [y/n]?
```

▶   Enter *y* to start the server during the installation, or *n* to start it manually after the installation.

Upgrade of the accounts database (*lmxupgrade*)

If you have started the server, the upgrade is executed automatically and the output of the command *lmxupgrade* is written to the screen and the file
/var/opt/lanman/logs/lmxupgrade.log.

If the server is not started, the following message gives you information on how to upgrade later:

```
Access Control Entries can be upgraded from the LAN Manager 2.x accounts
file (/var/opt/lanman/datafiles/accounts.lm2) after the user accounts and
groups have been replicated to this backup controller.

You will need to manually run lmxupgrade -A ... after this has occurred.
```

In this case, the administration files must be adjusted **after** Advanced Server for UNIX has been started.

► Start AS/X with *asx start*.

► Use the *net user* command to check whether the account data has already been transferred to this backup domain controller. If it has not been transferred, you can start the transfer using the command *net accounts /sync*. If there are problems transferring the account data, you may have to call */var/opt/lanman/bin/joindomain* to re-establish the connection again.

► If the account data has been updated on this backup domain controller, the access permissions must be created for Advanced Server for UNIX. Call */var/opt/lanman/bin/lmxupgrade -YA*.

Watch the output of the command for files and directories which are not found for upgrading access permissions.

4.8.4 Upgrade installation of a primary domain controller from Version 3.5 or 4.0

To upgrade a primary domain controller from a previous Advanced Server for UNIX version, proceed as follows. In contrast to an upgrade installation from Version 2.x, the data can be upgraded directly; no conversion has to be done.

► Log on as system administrator *root*.

► Start the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxserver* package under AS/X.

Stop the server

► Choose *y* to stop the server.

Interactive or non-interactive installation

▶ Choose *interactive* for interactive installation.

The following description applies for interactive installation.

The system now copies the files from the installation medium and sets up specific users and user groups for Advanced Server for UNIX.

Output language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

▶ Enter the output language.

Interface name of the spooler used by the server

The system now displays all configurable spoolers and outputs the message

```
Please enter the interface name or press ENTER if it is <spool interface>:
```

▶ Enter the interface name of the spooler.

Server name

The server name is incorporated from the previous installation, if possible.

Server role

The server role is incorporated from the previous installation, if possible.

Domain name

The domain name is incorporated from the previous installation, if possible.

Administrator's password

The password of the account *Administrator* is incorporated from the previous version.

Domain Language

The domain language is incorporated from the previous version, if the databases could be successfully checked and taken over. In the event that a database is inconsistent, the installation repairs the database. If the database is too corrupt to repair, the installation is aborted and you have to repair the database manually (e.g. restore the databases from a system backup).

Note that if the previous version was an Advanced Server for UNIX Version 3.5, the domain language will always be *ENGLISH*.

⚠ Changing the domain language after the installation is only possible with loss of all user and group accounts. Use */var/opt/lanman/bin/joindomain* to perform this task.

Windows NT-style Printing

When there have been shared printers from a previous installation, you now have to decide how to upgrade these printers.

The system displays some information and the message

```
You can choose to disable Windows NT-style printing and allow Windows NT
client computers to print without first administering each print share on
this server.You can enable this feature at any time in the future.
```

```
Do you want to disable Windows NT-style printing [y/n]?
```

▶   Enter your selection.

Start the server

The installation is now complete.

The system offers you the option of starting the server immediately:

```
Do you want to start the Advanced Server [y/n]?
```

▶   Enter *y* (yes) or *n* (no).

4.8.5   Upgrade installation of a backup domain controller from Version 3.5 or 4.0

To upgrade a backup domain controller from a previous Advanced Server for UNIX version, proceed as follows. In contrast to an upgrade installation from Version 2.x, the data can be upgraded directly; no conversion has to be done. Normally the upgrade of a backup domain controller does not differ from the upgrade of a primary domain controller.

However there is one known problem during the upgrade of an Advanced Server for UNIX Version 3.5 that was a backup domain controller on a server with a **german** names for builtin objects (either a german Windows NT Server or an Advanced Server for UNIX Version 4.0 with a german *domain language*). In this case it can happen that the database is reported corrupt. See the detailed description below.

If the primary domain controller of the domain you want to join is located in a different subnet, you have to ensure that the domain name and the server name of the primary domain controller can be resolved by the local NetBIOS. Please refer to the section "Installing NetBIOS" on how to accomplish this. Although this name resolution is important for the functionality of the backup domain controller, it is needed during the installation only if the database is corrupt.

► Log on as system administrator *root*.

► Start the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxserver* package under AS/X.

Stop the server

► Choose *y* to stop the server.

Interactive installation

► Choose *interactive* for interactive installation.

The following description applies for interactive installation.

The system now copies the files from the installation medium and sets up specific users and user groups for Advanced Server for UNIX.

Output language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is „ENGLISH":
```

▶   Enter the output language.

Interface name of the spooler used by the server

The system now displays all configurable spoolers and outputs the message

```
Please enter the interface name or press ENTER if it is <spool interface>:
```

▶   Enter the interface name of the spooler.

Checking the accounts database

During the installation, the accounts database from the previous version is checked. If some corruption is detected, the accounts database is replicated from the primary domain controller.

In this very special case, the server name, the administrator on the primary domain controller, the administrator password and the domain language have to be entered.

Server name

The server name is incorporated from the previous installation, if possible.

Server role

The server role is incorporated from the previous installation, if possible.

Domain name

The domain name is incorporated from the previous installation, if possible.

Name of the primary domain controller

The name of the primary domain controller is incorporated from the previous installation, if possible.

In the case of database corruption, the name of the primary domain controller has to be entered:

```
Enter the name of the primary domain controller:
```

►   Enter the name of the primary domain controller.

Name of the administrator

All user accounts are automatically taken over from the previous installation.

In the case of database corruption, the name of the administrator has to be entered:

```
Enter the name of an administrative account on '<primary name>'
or press Enter to select 'administrator':
```

►   Enter the name of an administrative account.

Administrator's password

The password of the account *Administrator* is incorporated from the previous version.

In the case of database corruption, the password of the administrative account has to be entered here twice:

```
Enter the password for administrator:
Re-enter password:
```

Domain Language

The domain language is incorporated from the previous version, if the databases could be successfully checked and taken over.

If the database is reported to be corrupt (e.g. due to the usage of mixed languages within the domain), you have to enter the domain language of the primary domain controller here. Normally you will change the domain language here to avoid the same problem in the future.

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

▶ Enter the domain language of the primary domain controller.

A new AS/X database is now created using the specified language and the account data is replicated from the primary domain controller in the correct language.

Windows NT-style Printing

When there have been shared printers from a previous installation, you now have to decide how to upgrade these printers.

The system displays some information and the message

```
You can choose to disable Windows NT-style printing and allow Windows NT
client computers to print without first administering each print share on
this server.You can enable this feature at any time in the future.

Do you want to disable Windows NT-style printing [y/n]?
```

▶ Enter your selection.

Start the server

The installation is now complete.

The system offers you the option of starting the server immediately:

```
Do you want to start the Advanced Server [y/n]?
```

▶ Enter *y* (yes) or *n* (no).

4.8.6 New installation of a primary domain controller

The following sections describe how Advanced Server for UNIX is installed as a primary domain controller on a system on which neither LAN Manager/X nor Advanced Server for UNIX was previously installed or on which the LAN Manager/X or Advanced Server for UNIX installation has been fully deinstalled.

If the servers of the domain are distributed over several subnetworks, ensure that NetBIOS can resolve the server names. For details on configuring NetBIOS name resolution, please refer to the section "Configuring NetBIOS Name Resolution".

To install a primary domain controller, proceed as follows.

▶ Log on as system administrator *root*.

▶ Start the installation procedure as described in the section "Installing from CD-ROM with cdinst".

▶ Select the *asxserver* package under AS/X.

Stop the server

► Choose *y* to stop the server.

Interactive or non-interactive installation

► Choose *interactive* for interactive installation.

The following description applies for interactive installation.

The system now copies the files from the installation medium and sets up specific users and user groups for Advanced Server for UNIX.

Output language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is „ENGLISH":
```

► Enter the output language.

Interface name of the spooler used by the server

The system now displays all configurable spoolers and outputs the message

```
Please enter the interface name or press ENTER if it is <spool interface>:
```

► Enter the interface name of the spooler.

Server name

The system generates a default server name from the system name and displays the message

```
Enter the name of the server or press Enter to select <system name>:
```

► Enter the server name.

Server role

The message

```
Enter role (primary or backup) or press Enter to select 'primary':
```

is displayed.

► Enter the server role 'primary'.

Domain name

The system suggests a domain name, which is formed from the system name and the extension *.dom*.

The message

```
Enter the name of the domain or press Enter to select '<system name.dom>':
```

is displayed.

▶   Enter the domain name.

Confirm choices

The server name, the server role and the domain name have to be confirmed now or can be re-entered.

Administrator's password

The password of the account *Administrator* has to be entered twice:

```
Enter the password for administrator:
Re-enter password:
```

Domain Language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

▶   Enter the domain language.

A new AS/X database is now created using the specified language.

Start the server

The installation is now complete.

The system offers you the option of starting the server immediately:

```
Do you want to start the Advanced Server [y/n]?
```

▶   Enter *y* (yes) or *n* (no).

4.8.7 New installation of a backup domain controller

The following sections describe how Advanced Server for UNIX is installed as a backup domain controller on a system on which neither LAN Manager/X nor Advanced Server for UNIX was previously installed or on which the LAN Manager/X or Advanced Server for UNIX installation has been fully deinstalled.

If the primary domain controller of the domain you want to join is located in a different subnet, you have to ensure that the server name of the primary domain controller and the domain name can be resolved by the local NetBIOS. Please refer to the section "Installing NetBIOS" on how to accomplish this.

To install a backup domain controller, proceed as follows.

► Log on as system administrator *root*.

► Start the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxserver* package under AS/X.

Stop the server

► Choose *y* to stop the server.

Interactive or non-interactive installation

► Choose *interactive* for interactive installation.

The following description applies for interactive installation.

The system now copies the files from the installation medium and sets up specific users and user groups for Advanced Server for UNIX.

Output language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

► Enter the output language.

Interface name of the spooler used by the server

The system now displays all configurable spoolers and outputs the message

```
Please enter the interface name or press ENTER if it is <spool interface>:
```

► Enter the interface name of the spooler.

Server name

The system generates a default server name from the system name and displays the message

```
Enter the name of the server or press Enter to select <system name>:
```

► Enter the server name.

Server role

The message

```
Enter role (primary or backup) or press Enter to select 'primary':
```

is displayed.

► Enter the server role 'backup'.

Name of the primary domain controller

The system displays the message

```
Enter the name of the primary domain controller:
```

► Enter the name of the primary domain controller.

The primary domain controller must be running and connected to the network.

Domain name

During the installation of a backup domain controller, the domain name is automatically obtained from the primary domain controller.

Name of the administrator

The message is displayed:

```
Enter the name of an administrative account on '<primary name>'
or press Enter to select 'administrator':
```

► Enter the name of an administrative account.

Administrator's password

The password of the administrative account has to be entered twice:

```
Enter the password for administrator:
Re-enter password:
```

Contacting the primary domain controller

The server now uses this information to establish contact with the primary domain controller and, among other things, to get the domain name.

If the contact can be succcessfully established, continue with confirming the choices.

If the contact could not be established, an error message is displayed that describes the problem, e.g.:

```
ERROR: Creation of remote account failed - Server Unavailable. The primary
domain controller '<primary name>' is not running or is not connected to
this network.

Do you want to retry [y/n]?
```

Check whether

- it is possible to reach the primary domain controller using the *ping* command.

- the domain name and the name of the primary domain controller can be resolved by the local NetBIOS. Refer to the section "Installing NetBIOS" on how to accomplish this.

- the local server name can be resolved by the NetBIOS of the primary domain controller. If the primary domain controller is an Advanced Server for UNIX computer, refer to the section "Configuring NetBIOS Name Resolution". If the primary domain controller is a Windows NT server system, please refer to the Microsoft documentation.

- the primary domain controller has been started.

- the server name of the primary domain controller, the login name of the administrator and the password have been specified correctly.

If the problem can be fixed immediately, enter *y* to re-establish the connection to the primary domain controller.

If the problem has to be fixed later, enter *n*. In this case, the installation will proceed, but the server will become a primary domain controller (!) with a temporary domain name, so that you can complete the configuration after the problem is fixed:

▶ Use the command */var/opt/lanman/bin/joindomain* to change the role of the server to a backup domain controller.

Confirm choices

The server name, the server role, the domain name and the name of the primary domain controller have to be confirmed now or can be re-entered.

Domain Language

The system now displays the supported languages (*ENGLISH* and *GERMAN*) and outputs the message

```
Please enter the language or press ENTER if it is "ENGLISH":
```

►   Enter the domain language of the primary domain controller.

A new AS/X database is now created using the specified language.

Start the server

The installation is now complete.

The system offers you the option of starting the server immediately:

```
Do you want to start the Advanced Server [y/n]?
```

►   Enter *y* (yes) or *n* (no).

4.8.8   After the installation

Automatic Start and Stop

During the package installation, the start and stop scripts of the server are placed into the */etc/rc2.d* and */etc/rc0.d* directories, so that Advanced Server for UNIX is automatically started and stopped together with the UNIX system.

Advanced Server for UNIX environment variables

The first time you log on after installation, the following environment variables are present:

Environment variable	Meaning
$xASX	Installation path, under which the Advanced Server for UNIX software is located (always: */var/opt/lanman*)
$LM_HOMEDIR	Object path, $xASX/bin
$xLMX	Compatibility with the previous versions

> **i** Check whether these variables exist. If necessary, start the */etc/rclmx* script with
> *. /etc/rclmx*.

Windows NT-Style Printing

To enable Windows NT-style Printing after an upgrade installation, set the value of the
DisableUpLevelPrinting key to 0 in the Advanced Server for UNIX registry. Restart the server,
and then associate a printer driver with each printer share used by Windows NT clients (see
chapter "Setting Up Print Servers" in the "Concepts and Planning" manual for more infor-
mation).

Upgrade of *lanman.ini* parameters

As a result of upgrading LAN Manager/X or Advanced Server for UNIX most of the values
in your previous *lanman.ini* configuration file are mapped to Advanced Server registry
keywords. Some *lanman.ini* file parameters are not incorporated into the registry but are
stored in a new *lanman.ini* file. A copy of your previous *lanman.ini* file is saved and renamed
lanman.old. For more information about the "Advanced Server Registry" and the
"Lanman.ini File" see the appropriate chapters.

Converting the german umlauts from previous versions (*mapnames*)

Starting with Version 3.5B, Advanced Server for UNIX uses a new character set.

As a result, some file and directory names with umlauts created with all LAN Manager/X
versions and with Advanced Server for UNIX Version 3.5A can no longer be displayed by
the client after an upgrade.

A utility is being shipped with Advanced Server for UNIX since Version 3.5B which renames
files and directory names containing german umlauts and adjusts their permissions so that
they correspond to the new character set.

The conversion has to be performed **only once**, if you already upgraded to Version 3.5B
before, this step is not necessary.

For further information on this topic please refer to the information in the chapter entitled
"Troubleshooting": section "File names with umlauts are not visible after an upgrade".

4.9 Installing optional packages

Installation of the packages *asxdocs, asxman*, *asxtools*, *asxtoolsD*, *msclients*, and *asxsnmp* is optional. When you have finished installing Advanced Server for UNIX, you can install all or some of these packages afterwards as required.

Each of these packages is installed as described in the section "Installing from CD-ROM with cdinst". During the installation of the packages *asxdocs*, *asxtools*, *asxtoolsD* and *msclients,* a resource containing the associated software is shared automatically with a sharename derived from the package name.

msclients

This package contains the following PC client software:

● Microsoft LAN Manager Client 2.2c

● Microsoft Network Client 3.0

● TCP/IP-32 for Windows for Workgroups 3.11

● Update for Windows for Workgroups 3.11

For information on generating client diskettes, please refer to the section "Installing from CD-ROM with cdinst".

asxtools and asxtoolsD

These packages contain the Windows NT Server Tools for the following platforms and are available in German or English:

● Windows, Windows for Workgroups and Windows 95/98

● Windows NT Workstation 3.51 and 4.0

For information on memory requirements, please refer to the table in the section "Hard disk storage".

asxman

This package contains UNIX manual pages for the API as well as for all Advanced Server for UNIX commands. The manual "API Reference" contains as a supplement the data structures and an overview of the API functions. Please refer to the manual pages of this package for more detailed information.

asxdocs

This package contains the manuals for Advanced Server for UNIX in PDF format as well as a version of Acrobat Reader.

asxsnmp

This package contains the extensions for the SNMP Service. For further information, please refer to the LAN Manager/X manual "SNMP Service".

4.9.1   Installing the msclients package

Installation of the *msclients* package is optional. This package contains the following PC client software:

● Microsoft LAN Manager Client 2.2c (MS-DOS)

● Microsoft Network Client 3.0 (MS-DOS)

● TCP/IP-32 for Windows for Workgroups 3.11

● Update for Windows for Workgroups 3.11

> **i**
>
> ● The package comprises approximately 20 Mbytes. In order that it can be installed in a file system that has sufficient free disk space, you can specify an installation path during installation.
>
> ● To generate installation diskettes, it is sufficient to install this package on one server only.

Now install the *msclients* package with the following steps:

▶ Log on as system administrator *root*.

▶ Establish which file system contains sufficient free disk space.

▶ Carry out the installation procedure as described in section "Installing from CD-ROM with cdinst".

▶ Select the package called *msclients* under *AS/X*.

▶ During installation, specify the name of the directory where you want to install the client software. The system now copies the data from the volume to the specified directory.

A resource with the sharename *msclient* is shared automatically. This contains the software for the client types mentioned above.

For information on generating the client diskettes, please refer to the section "Creating Installation Diskettes".

Please refer to the "readme.txt" file in the "update.wfw/disks/disk1" directory for information on how to install the update for Windows for Workgroups.

4.9.2   Installing the asxtools and asxtoolsD packages

Installation of the *asxtools* and *asxtoolsD* packages is optional. The *asxtools* package contains the English software, while the *asxtoolsD* package contains the German software for the Windows NT Server Tools for the following platforms:

● Windows, Windows for Workgroups

● Windows 95/98

● Windows NT Workstation Version 3.51

● Windows NT Workstation Version 4.0

> **i**
>
> ● Both packages comprise approximately 20 Mbytes. In order that they can be installed in a file system that has sufficient free disk space, you can specify an installation path during installation.
>
> ● It is sufficient to install the required language variant of this package on only one of the servers in a domain.

Now install the *asxtools* or *asxtoolsD* package with the following steps:

► Log on as system administrator *root*.

► Establish which file system contains sufficient free disk space.

► Carry out the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the package called *asxtools* or *asxtoolsD* under *AS/X*.

► During installation, specify the name of the directory where you want to install the Windows NT Server Tools.

The system now copies the data from the volume to the specified directory. A resource with the sharename *astools* or *astoolsD* is shared automatically.

For information on installing the server tools from this directory on a PC client or a Windows NT workstation, please refer to the section "Administrative Clients".

4.9.3   Installing the asxman package

Installation of the *asxman* package is optional, but recommended. The package contains UNIX manual pages for the API of Advanced Server for UNIX as well as for all Advanced Server for UNIX commands. The manual "API Reference" contains the data structures and an overview of the API functions as a supplement to this. Please refer to the manual pages of this package for more detailed information.

Install the *asxman* package with the following steps:

► Log on as system administrator *root*.

► Carry out the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxman* package under *AS/X*.

The system now copies the data from the volume to */usr/share/man/mrd/catman/asx*.

4.9.4   Installing the asxdocs package

Installation of the *asxdocs* package is optional. In addition to the manuals for Advanced Server for UNIX in PDF format, the package also contains an "Acrobat Reader" (English language) for installation on a workstation.

Install the *asxdocs* package with the following steps:

► Log on as system administrator *root*.

► Carry out the installation procedure as described in the section "Installing from CD-ROM with cdinst".

► Select the *asxdocs* package under *AS/X*.

► During installation, specify the name of the directory where you want to install the documentation files.

The system copies the files from the volume to the specified directory. If Advanced Server for UNIX is already installed, a resource with the sharename *asdocs* is shared automatically.

The Acrobat Reader program (either *ar16e30.exe* for Windows 3.x or *ar32e30.exe* for Windows 95/98 or Windows NT) which is stored in the *acrobat* directory, must be invoked for installation on a workstation. The Acrobat Reader is then installed on the workstation and can be used to read the PDF files.

The *asxdocs* package can be installed prior to installation of AS/X so that the documentation can be accessed before Advanced Server for UNIX is installed. Both the Acrobat Reader and the PDF files must then be transferred to a workstation by some other means (e.g. via FTP).

4.10   Installing with the default configuration

You can install the *asxserver*, *asxtools,* or *asxtoolsD* and *msclients* packages with a default
configuration without any further input.

i The default parameters for all packages are listed at the end of this section.

Carry out the following steps in the given sequence:

1. Log on as system administrator *root* and insert the CD in the drive of the system, from
   which you want to install the software.

2. Start the installation program with *cdinst*. The following dialog box is displayed:

```
        1                           Process Multi−Product CD−ROM

Server:                local
CD−ROM device name:    /dev/ios0/sdisk005s0
Remote pathname/
Local mountpoint:       /cdrom0

Fill in the form and then press SAVE.
```

   ► Position the cursor on *CD-ROM device name* and select the device name for the CD-
     ROM drive with [F2] (*CHOICES*). Then select [F3] (*SAVE*) in order to confirm
     your entry. You are then given a general message about the volume.

   ► Acknowledge with [F8] (*CONTINUE*).

3. Use the cursor to mark the *ASX* set in the list displayed and then press [F2] (*MARK*)
   and [F3] (*ENTER*). The following is displayed:

```
   2

info                − Display Detailed Product Information
pkginfo             − Display Detailed Information on Packages
README              − Display README Files
install             − Install Products

Move the cursor to the item you want and press ENTER to
select it.
```

4. Select *install* and then press `F2` (*MARK*) and `F3` (*ENTER*) in order to start installation of the individual packages.

```
  4                    Install

 Install:                          Package
 Installation mode:                dialog
 Installation default file name:   default
 Path to response files:           /tmp/16632/response


 Fill in the form and then press SAVE.
```

In the *Install* selection field you can select between *Complete Product*, *SIreadmeM*, and *Package*. Press `F2` (*CHOICES*) to make your selection.

⚠ Do not select Complete Product. The installation will fail with this selection.

► Select *Package*.

The *Installation mode* selection field offers a choice between *automatic* and *dialog*. Press `F2` (*CHOICES*) to make your selection.

► Select *automatic* as the installation mode.

► Select the entry *on CD-ROM* under *Path to response files* using `F2` (*CHOICES*).

► Press `F3` (*SAVE*).

5. The following selection is displayed (for contents of the packages see the section "Advanced Server for UNIX delivery package"):

```
  5         Packages
 AS/X 4.0<version>  SIreadmeM
 AS/X 4.0<version>  nbrfc
 AS/X 4.0<version>  asxserver
 AS/X 4.0<version>  asxtools
 AS/X 4.0<version>  asxtoolsD
 AS/X 4.0<version>  msclients
 AS/X 4.0<version>  asxman
 AS/X 4.0<version>  asxdocs
 AS/X 4.0<version>  asxsnmp
 AS/X 4.0<version>  asxdebug
 Mark the items you want and press ENTER to select them.
```

6. Use the cursor to select the required packages and press `F2` (*MARK)*. Then start the installation with `F3` (*ENTER*).

The installation is started implicitly with *pkgadd*.

Default parameters for the *asxserver* package:

```
R_INSTTYPE='automatic'
R_PKGNAME='Advanced Server 4.0 for UNIX'
R_VERSION='4.0B0003'
R_LMXSPOOLER='default'
R_AUTOSTART='NO'
R_PASSWORD='password'
R_LANG='ENGLISH'
R_DOMAINLANG='ENGLISH'
R_SAVEONREMOVAL='YES'
R_MAPWARNTOERR='NO'
SERVERNAME='default'
DOMAIN='default'
ROLE='primary'
PRIMARY=''
ADMIN_ACCT='administrator'
STOPSERVER='YES'
USE_DEFAULT_PASSWD='NO'
ASK_ABOUT_PRINTER_UPGRADE='NO'
ALWAYS_USE_UPLEVEL_PRINTING='NO'
```

| i | The entry *default* means that the value for the parameter is automatically formed on the system. |

In the case of an upgrade installation, as many configuration information as possible is automatically incorporated from the previous version. Then the corresponding default parameter is ignored.

The default response file gives the following answers. Please refer to section "Installation steps" for more information.

Installation step: Stop the server
Parameter: STOPSERVER
Value: YES

Installation step: Interactive or non-interactive installation
Parameter: R_INSTTYPE
Value: automatic (non-interactive)
Parameter: R_MAPWARNTOERR
Value   NO

> **i** By default, warnings are mapped to state "OK" during the installation. If
> *R_MAPWARNTOERR* is set to YES, the warnings are mapped to the state "ERROR".

Installation step: Output language
Parameter: R_LANG
Value: ENGLISH

Installation step: Interface of the spooler used by the server
Parameter: R_LMXSPOOLER
Value: default (the spooler configured in UNIX)

Installation step: Server name
Parameter: SERVERNAME
Value: default (system name)

Installation step: Server role
Parameter: ROLE
Value: Domain name

Installation step: Domain name
Parameter: DOMAIN
Value: default (system name with .dom)

Installation step: Name of the primary domain controller
Parameter: PRIMARY
Value: <empty>

Installation step: Name of the administrator
Parameter: ADMIN_ACCT
Value: administrator

Installation step: Administrator's password
Parameter: R_PASSWORD
Value: password (has to be changed!)
Parameter: USE_DEFAULT_PASSWD
Value: Value:

Installation step: Domain language
Parameter: R_DOMAINLANG
Value: ENGLISH

Installation step: Windows NT-style Printing
Parameter: ASK_ABOUT_PRINTER_UPGRADE
Value: NO
Parameter: ALWAYS_USE_UPLEVEL_PRINTING
Value: NO

Installation step: Start the server
Parameter: R_AUTOSTART
Value: NO

Installation step: Deinstalling the server
Parameter: R_SAVEONREMOVAL
Value: NO

| i | After an default installation of the *asxserver* package,deinstallation of the package on the target system will also run without any interaction. The AS/X configuration files will automatically be saved for an upgrade installation. If you want to remove AS/X completely, you have to modify the variable *R_SAVEONREMOVAL=NO* in the file */var/sadm/pkg/asxserver/pkginfo*. |

The parameters *R_PKGNAME* and *R_VERSION* are used for internal purposes.

The */var* installation path is used for the *asxtools* package.
Default response file for the *asxtools* package:

NEXUS='/var/opt/lanman/shares/astools'

The */var* installation path is used for the *asxtoolsD* package.
Default response file for the *asxtoolsD* package:

```
NEXUS='/var/opt/lanman/shares/astools.deu'
```

The */var* installation path is used for the *msclients* package.
Default response file for the *msclients* package:

```
MSCLIENT='/var/opt/lanman/shares/msclient'
```

4.11 Deinstalling Advanced Server for UNIX V4.0

Deinstall the software in the following sequence:

● begin with the optional packages (including AS/X Service Packs from the field support)

● then the server

● followed by NetBIOS.

4.11.1 Deinstalling optional packages

To deinstall the *<Package>* package, carry out the following steps:

1. Log on as system administrator *root*.

2. Enter *pkgrm <Package>*.

   ► Confirm with RETURN. The software of the package is now deleted.

   ► Repeat the *pkgrm <Package>* command for all optional packages installed.

4.11.2 Deinstalling the server

Work through the following steps:

1. Log on as system administrator *root*

2. Stop the server using the *asx stop* command

3. Enter *pkgrm asxserver*

   ▶ Verify with the ⌈RETURN⌋ key. The server software is now deleted.

      | **i** | If the server software was installed with the default configuration, no further prompts are issued during deinstallation. The configuration files are not deinstalled in this case.

   ▶ At the prompt `Would you like to retain any of these data items [y/n]?` you can enter *y* to save the configuration files for a subsequent installation.

The files and directories of the users are not affected by your decision and will **not** be deleted.

The system will ask you if you wish to save or delete the following data:

● User data in the public directories *DOSUTIL, OS2UTIL, LIB* and *PRINTLOG*, which was not created when the server was installed.

● Customized print processor scripts.

● Information about shared printers (servers and workstations). Printers are either linked directly to the server or to specific workstations (shared client printer). If you enter *n* here, all data relating to the printer will be deleted.

● AS/X users and accounts.

● Configuration files and registry database.

● WINS database.

| **i** | The logon scripts are saved automatically.

4.11.3 **Deinstalling NetBIOS**

Work through the following steps:

1. Log on as system administrator *root*.

2. Enter *pkgrm nbrfc*.

   ► Verify with the ⌈RETURN⌉ key. NetBIOS is now deleted, and a new UNIX kernel is generated. During this process you will receive a corresponding system wait message.

   The configuration files remain in the *var/opt/nbrfc/conf* directory and can be saved from there, or can be left there for a later reinstallation. In this case the reinstallation will use the existing configuration.

3. Start the system with the newly generated UNIX kernel or, if necessary, install a new NetBIOS and then start the system.

5 Configuring Advanced Server for UNIX

This chapter contains the information required to configure Advanced Server for UNIX. You must have *root* privilege to configure NetBIOS and Advanced Server for UNIX.

5.1 Configuring NetBIOS

The following section first gives a brief introduction to NetBIOS.

The remaining sections include the following type of information you need to configure NetBIOS:

● The second section describes how to configure network interfaces so that they can be used by NetBIOS.

● The 3rd section describes how to configure NetBIOS name resolution.

● If not stated otherwise all following descriptions imply that all NetBIOS tuning parameters use predefined values. The fourth sections will show how – in case of need – the behavior of NetBIOS can be influenced by changing the tuning parameters.

In what follows the reader is assumed to be familiar with the basic concepts and terms of TCP/IP networking (IP addresses, netmasks, subnets etc.).

5.1.1   Introduction to NetBIOS

An important part of Advanced Server for UNIX communication is not based directly on TCP/IP protocols but uses NetBIOS.

In terms of the OSI Reference Model for a layered networking architecture, NetBIOS is a level 5 protocol ("Session Layer"). The session layer establishes a communications session between processes running on different computers. Functions of the session layer include:

- Name Service: The Name Service allows application processes to register unique NetBIOS names. It provides the means by which these names can be resolved to the network layer.

- Session Service: The Session Service is responsible for establishing, monitoring, and terminating a virtual-circuit session between two processes identified by their NetBIOS names.

- Datagram Service: This service allows application processes identified by their NetBIOS names to exchange datagrams (messages of limited length).

On Advanced Server computers, NetBIOS services are provided by two STREAMS drivers which are linked to the UNIX kernel during NetBIOS installation.

NetBIOS Names

The NetBIOS name space is flat (that is, it is not hierarchical), so all names within a network must be unique. NetBIOS names are 16 characters in length. Advanced Server for UNIX as well as Microsoft networking components allow the first 15 characters of a NetBIOS name to be specified by the user or administrator (usually a given name is converted to uppercase letters and padded with spaces), but reserve the 16th character of the NetBIOS name to indicate a resource type (00-FF hex). Names can be registered as unique (one owner) or as group (multiple owner) names. In addition to this there is also the concept of an *internet group* (with multiple owners and multiple addresses). Following are the important NetBIOS names used in Advanced Server environments:

Unique names:

<computername>[0x00]   Workstation Service
<computername>[0x03]   Messenger Service
<computername>[0x20]   Server Service
<username>[0x03]   Messenger Service
<domain_name>[0x1D]   Master Browser
<domain_name>[0x1B]   Domain Master Browser (PDC)

Group names:

<domain_name>[0x00]	Domain Name
<domain_name>[0x1C]	Domain Controllers ("Domain Group"/"Internet Group")
<domain_name>[0x1E]	Browser Service Elections
. . __MSBROWSE__ . [0x01]	Master Browser

Information on the meaning of the various NetBIOS name extensions and their usage can be found in the "Microsoft Windows NT Resource Kit Networking Guide".

The two most important aspects of the NetBIOS name service are *registration* and *resolution*:

● *Registration* is the process used to register a unique name for each computer (node) on the network. A computer typically registers itself when it starts.

● *Resolution* is the process used to determine the specific IP address for a certain NetBIOS name.

An Advanced Server for UNIX computer can use one or more of the following methods to ensure accurate name resolution in TCP/IP internetworks:

Broadcast name resolution

Broadcast name resolution is a NetBIOS over TCP/IP mode of operation defined in RFC 1001/1002 as **b-node**. This method relies on a computer making IP-level broadcasts to register its name by announcing it on the network and to query a name by asking all other computers in the broadcast area. Each computer in the broadcast area is responsible for challenging attempts to register a duplicate name and for responding to name queries for its registered name.

Broadcast name resolution has two major problems:

1. Broadcast messages typically do not pass IP routers, so computers that are on opposite sides of a routers are not reachable.

2. In a large environment, it loads the network with broadcasts, which every computer must handle.

names.cfg file

On Advanced Server for UNIX computers, a *names.cfg* file (residing in */var/opt/nbrfc/conf*) can be used to specify static mappings of NetBIOS names to IP addresses. These mappings can be loaded into an internal name table. If a b-node attempt fails, the system looks in this name table to find a name and then uses the associated address to cross the router. The function of the *names.cfg* file is comparable to the LMHOSTS file known from the Microsoft networking components, however the format differs.

Files with static mappings, like LMHOSTS or *names.cfg* files, allow NetBIOS name resolution to span routers, thus solving the problem of b-node name resolution in routed environments. However, each computer must have the necessary list of static mappings, and all lists must be consistent. This creates an administrative burden in maintaining and distributing the lists.

Windows Internet Name Service (WINS)

A computer can use WINS if at least one WINS server is available that contains a dynamic database that maps computer names to IP addresses. WINS can be used in conjunction with broadcast name resolution for an internetwork where other name resolution methods are inadequate. As described in chapter "Implementing WINS", WINS is a NetBIOS over TCP/IP mode of operation defined in RFC 1001/1002 as **p-node**. When configured as a WINS client, Advanced Server computers use a variant of p-node known as **h-node**.

WINS is designed to solve the problems that occur with name resolution in medium sized and complex internetworks and is the preferred method for name resolution. For details on the WINS service, consult the chapter "Implementing WINS".

An Advanced Server for UNIX computer never uses DNS (the Internet Domain Name Service) for NetBIOS name resolution purposes.

All name resolution methods depicted above can be combined with each other. How name resolution is handled on an Advanced Server for UNIX computer is explained in more detail in "Configuring NetBIOS Name Resolution".

5.1.2   Configuring Network Interfaces

5.1.2.1   The interfaces.cfg file

In general every network interface for which TCP/IP is supported can be used by Advanced Server's NetBIOS. The file *var/opt/nbrfc/conf/interfaces.cfg* is used to describe the network interfaces to be used by NetBIOS and their properties.

This file is automatically created during NetBIOS installation, if it does not already exist. In many cases it is not necessary to change this automatically created file. Depending on the TCP/IP configuration at the creation time of the file there are several sections each describing a network interface. The syntax of a section is the following:

Syntax of a section in *interfaces.cfg*:

```
[<interface_name>]
    active=yes | no
    used_by_wins=yes | no
    ip_addr=default | <ip_address_ddn>
    brdcast_addr=default | <brdcast_addr_ddn>
    brdcast_list=<brdcast_list>
    netmask=default | <netmask_ddn>
```

Within a section,

<interface_name>	is the name (from *ifconfig(1M)*) of the interface configured by this section. The name is given inside square brackets.
<ip_address_ddn>	is the IP address of the interface given in dotted decimal notation. (Usually you will use the "default" keyword instead.)
<brdcast_addr_ddn>	is the broadcast address of the interface given in dotted decimal notation. (Usually you will use the "default" keyword instead.)
<brdcast_list>	is an **optional** (!) comma-separated list of broadcast addresses given in dotted decimal notation.
<netmask_ddn>	is the netmask of the interface given in dotted decimal notation or as a hex value. (Usually you will use the "default" keyword instead.)

Example of an automatically created *interfaces.cfg* **file:**

```
#
#               NBRFC configuration file
#               Created: Fri Sep 19 09:31:07 1997
#
#
[et0]
      active=yes
      used_by_wins=yes
      ip_addr=default
      brdcast_addr=default
#     brdcast_list=
      netmask=default
[madge0]
      active=yes
      used_by_wins=no
      ip_addr=default
      brdcast_addr=default
#     brdcast_list=
      netmask=default
```

The meaning of the keywords in a section is the following:

active=

Advanced Server for UNIX NetBIOS supports the concept of *active* and *inactive* inter-
faces. NetBIOS will use only active interfaces to send broadcasts and will only use the
IP address of active interfaces. If you do not want Advanced Server for UNIX NetBIOS
to use a certain interface, mark it with an `active=no` entry.

Note however, that you cannot prevent NetBIOS from sending and receiving packets
over an inactive interface which is UP in the sense of *ifconfig(1M)*, because in general
it is up to the lower network layers to decide which interface is to be used.

If all interfaces are deactivated (i.e. have the entry `active=no`), the first interface is
considered active. If the `active=` entry is missing, the corresponding network interface
is considered active.

You can also use the *nbconfig* command to dynamically activate or deactivate a precon-
figured interface.

used_by_wins=

This entry is only important if you plan to run the Advanced Server for UNIX WINS service on a multihomed system, i.e. a system having more than one IP address, since the WINS service must use a unique, well known IP address. Mark the interface you want to be used by the Advanced Server for UNIX WINS service with a line `used_by_wins=yes`.

If no interface is marked with a line `used_by_wins=yes`, NetBIOS will use the first active one for WINS.

ip_addr= , brdcast_addr=, netmask=

The three parameters can be taken directly from the systems IP configuration, they correspond to the output of an *ifconfig -i <interface>* command (see *ifconfig(1M)*).

If the keyword "default" is used for any of these parameters, the correct values are read automatically from the system at the time NetBIOS starts. However, the interface must be accessible in UNIX for this purpose (cf. *ifconfig <interface>*). If this is not true (e.g. in high availibility environments), the keyword "default" cannot be used and the values for the three parameters above must be given explicitly.

If an interface is DOWN in the sense of *ifconfig(1M),* the corresponding configuration section is loaded but the interface is set to *inactive.* You can then later use the *nbconfig* command to activate the interface, see below.

As a general rule, the keyword "default" – which is also inserted automatically at creation time of the *interfaces.cfg* file – should be used for any of these three parameters whenever possible. This has the advantage that an IP reconfiguration of an interface on the Advanced Server for UNIX computer (e.g. an address change) is transferred automatically to NetBIOS, and thus prevents inconsistent NetBIOS configurations.

brdcast_list=

Normally, broadcast name resolution is carried out in the local subnet only. With AS/X V3.5A20, the keyword "brdcast_list" was introduced to allow name resolution with directed broadcasts: When querying for a certain NetBIOS name, the Advanced Server for UNIX sends name query datagrams (IP level broadcasts) not only to the local subnet, but also to every subnet contained in this list. This method provided an easy way to let name resolution span routers (which normally do not forward broadcasts). Although this feature has several disadvantages, it is still supported for compatibility reasons. The keyword "default" is not allowed with this parameter.

To view the current NetBIOS configuration:

► At the command prompt, type

`/var/opt/nbrfc/bin/nbconfig -i`

If there are changes in the system network configuration – by adding or removing network interfaces – the NetBIOS configuration can be synchronized in different ways:

● If there were already manual changes in the file *interfaces.cfg* which must be kept, then a manual change with help of an editor is recommended. The right values for the parameters "ip_addr", "brdcast_addr", und "netmask" can be found out with the help of the command *ifconfig(1M)* in case you cannot use the keyword *default*.

● If this is not the case (e.g. after installation) you should create a new file with the help of the tool *cr_interfaces*.

To add or remove network interfaces:

► Edit the *interfaces.cfg* file. Delete sections and/or copy existing sections and modify the parameters as appropriate. Whenever possible, use the "default" keyword.

or

► Save the existing *interfaces.cfg* under a different name and create a new one by typing

`/var/opt/nbrfc/bin/cr_interfaces`

To check an existing configuration file *interfaces.cfg* without actually activating the new configuration:

► At the command prompt, type

`/var/opt/nbrfc/bin/get_config`

You should compare the output of this command with the output of the corresponding *ifconfig(1M)* commands.

To activate any changes you made to the NetBIOS configuration:

If Advanced Server for UNIX is running,

► Restart the Advanced Server for UNIX using the commands

`asx stop; asx start`

else

► Restart NetBIOS using the commands

`nbrfc stop; nbrfc start`

5.1.2.2   Commands used for configuring network interfaces

When configuring network interfaces, the following NetBIOS commands from */var/opt/nbrfc/bin* are used:

The *cr_interfaces* command creates the */var/opt/nbrfc/conf/interfaces.cfg* configuration file based on the information found in the UNIX system at runtime. The program runs at installation time but it can also be executed manually by the administrator e.g. to add a new interface.

Syntax:

cr_interfaces [-F]

Options:

-F   Force the creation of a new file. (Normally, an existing file is not overwritten.)

The *get_config* command reads the *interfaces.cfg* file; it does validity checks and displays error and/or warning messages as appropriate.

Syntax:

get_config

Use *get_config* before restarting NetBIOS whenever the *interfaces.cfg* file has changed in order to detect inconsistent or faulty configurations.

Example output of get_config:

```
Following interfaces found

No. Name    IP Address      Broadcast        Netmask     Subnet Active WINS
0   pnet0   144.145.111.71  144.145.111.255 0xffffff00 own     yes    conf
1   madge0  144.145.123.71  144.145.123.255 0xffffff00 own     no     no
```

In order to check a new *interfaces.cfg* file you should compare the output of *get_config* with the output of corresponding *ifconfig(1M)* commands.

The *nbconfig* command is used to view or to administer the state of the NetBIOS interfaces.

Use nbconfig either to display the current configuration or to dynamically activate or deactivate certain interfaces without having to restart NetBIOS.

Syntax:

nbconfig -i
nbconfig -e | -d <interface_no> [<interface no> ...]
nbconfig -E | -D <interface name> | <ip-address>
         [<interface name> | <ip-address> ...]

Options:

-i   The current NetBIOS configuration is read from the kernel and displayed.

-e | -d   <interface no> [<interface no> ...]

       The interface with the specified <interface no> is activated (-e option) or deactivated (-d option). Use the output of a previous *nbconfig -i* command to get the correct number (<interface_no>) of the interface you want to activate or deactivate.

-E | -D <interface name> | <ip-address>
       [<interface name> | <ip-address> ...]

       The interface with the specified name <interface name> or the specified IP address <ip-address> is activated (-E option) or deactivated (-D option). Use the output of a previous *nbconfig -i* command to get the correct name (<interface_name>) or IP address (<ip-address>) of the interface you want to activate or deactivate. "default" may not be used for <interface name>.

$\boxed{\mathbf{i}}$ Deactivating an interface does not make deactivation under UNIX obsolete in terms of removing a controller fully from the network. The deactivation simply prevents NetBIOS from sending broadcasts to the subnetworks and from using the IP address as the source address. NetBIOS will still send and receive packets over an interface which is UP in the sense of *ifconfig(1M)*, even if it is deactivated by *nbconfig*.

5.1.3 Configuring NetBIOS Name Resolution

NetBIOS name resolution is the process of successfully mapping a NetBIOS name to an IP address.

How name resolution is carried out on a Advanced Server for UNIX computer depends whether the computer has been configured as a WINS client (with the help of the file *wins.cfg)* or not.

If WINS is not enabled, name resolution works in the following manner ("modified b-node"):

1. Check the name table
2. Try broadcasting

To find a particular name, the Advanced Server for UNIX computer first checks its internal NetBIOS name table. This table contains

- local names

- a name cache consisting of mappings from recently received NetBIOS datagrams

and

- a list of static mappings from a *names.cfg* file.

If the name is not found, the computer sends name query request packets (as broadcast messages) on the local subnet. These broadcast messages normally cannot pass IP routers.

If WINS is enabled, name resolution works in the following manner (h-node):

1. Try a WINS server
2. Try broadcasting
3. Check the *name table*

To find a particular name, the Advanced Server for UNIX computer first queries its primary and/or secondary WINS server. If the WINS servers are not available or unable to map the name to an IP address, the computer switches to b-node but continues to poll for the WINS servers and switches back if a WINS server becomes available. The NetBIOS name table containing local names, a name cache consisting of mappings from recently received NetBIOS datagrams and a list of static mappings from a *names.cfg* file is consulted as a last resort.

The chapter "Implementing WINS" contains more comprehensive explanations on how WINS clients communicate with WINS servers.

Name resolution on an Advanced Server for UNIX computer is configured by editing two textfiles in the */var/opt/nbrfc/conf* directory:

● The *wins.cfg* file is used to configure an Advanced Server for UNIX computer as a WINS client.

● The *names.cfg* file is used to specify static mappings of NetBIOS names to IP addresses.

The following sections explain the usage of both files.

5.1.3.1   The wins.cfg file

In file **wins.cfg** you can enter two WINS server addresses by which means the Advanced Server for UNIX computer is configured as a WINS client. This file, together with a corresponding template file *wins.sam,* is automatically created in */var/opt/nbrfc/conf* during installation of the *nbrfc* package if it does not already exist.

To configure an Advanced Server for UNIX computer as a WINS client:

▶ Edit *wins.cfg* and fill in the IP addresses of a primary and a secondary WINS server. Any WINS-Server within reach – NT WINS or Advanced Server for UNIX 4.0 WINS – can be used.

▶ Run the file *wins.cfg* as a *sh* script:

```
cd /var/opt/nbrfc/conf; sh wins.cfg
```

The last command is executed automatically whenever NetBIOS starts, e.g. at system startup.

To view the current WINS client configuration:

► At the command prompt, type

    nbtstat −w

Example of */var/opt/nbrfc/conf/wins.cfg*:

```
########################################################################
# WINS client configuration file for nbrfc
########################################################################
#delete old WINS entries from old configurations
/var/opt/nbrfc/bin/delwins −s > /dev/null 2>&1
/var/opt/nbrfc/bin/delwins −p > /dev/null 2>&1

#uncomment the line and add the IP address to configure a primary WINS
/var/opt/nbrfc/bin/addwins −p 144.145.16.26

#uncomment the line and add the IP address to configure a secondary WINS
/var/opt/nbrfc/bin/addwins −s 144.155.17.199
```

WINS servers configured in the *wins.cfg* file are not only used for name resolution, but also for name registration, name renewal and name release.

> **i** Be sure to have the NetBIOS tuning parameter NBRFCWINSREG set to 1 if you want Advanced Server for UNIX to register names with WINS servers.

> **i** If the local machine is running the Advanced Server for UNIX 4.0 WINS service, it is recommended to configure both primary and secondary WINS to point to this WINS, i.e. to the local machine.

5.1.3.2   The names.cfg file

The *names.cfg* file is used to specify static mappings of NetBIOS names to IP addresses, thereby allowing name resolution to cross routers. The function of the *names.cfg* file is similar to the LMHOSTS file known from Microsoft networking components, although the format differs.

After NetBIOS installation, the */var/opt/nbrfc/conf* directory contains a sample file called *names.sam* which can be used as a template. Use the following rules to create and modify entries in the *names.cfg* file:

Lines with a number sign (#) is the first column are treated as comment; empty lines are ignored.

Each entry must be on a separate line and follow the syntax:

```
<NetBIOS_name>  <IP_address>  UN|GR  [#Ext1[,EXT2 ...]]
```

where

<NetBIOS_name>	is a name consisting of up to 15 characters (case is ignored; internally the name is converted to uppercase letters and padded with spaces),
<IP_address>	is given in dotted decimal notation,
UN or GR	denotes whether the name is a unique name ("UN": one owner) or a group name ("GR": multiple owners),
[#Ext1[,Ext2 ...]]	is an optional list of name extensions (16th Byte of NetBIOS name) given by hexadecimal values. For each name extension in the list one name is created in the internal name table. If not given, the list defaults to 00,03,20 for UNique names and 1C,00 for GRoup names.

Example of */var/opt/nbrfc/conf/names.cfg*:

```
#########################################################################
# Sample names.cfg to configure static NetBIOS names
#########################################################################
# My address is 144.145.100.10
# Primary domain controller of a trusted domain:
trustpdc        144.145.101.20  UN #00,20
trustpdc.dom    144.145.101.20  UN #1b
trustpdc.dom    144.145.101.20  GR #1c,00
# Other backup domain controllers (in remote subnet):
otherbdc1       144.145.102.30  UN
otherbdc2       144.145.102.31  UN
```

To configure static names on an Advanced Server for UNIX computer:

▶   In */var/opt/nbrfc/conf*, copy *names.sam* to *names.cfg*. Edit *names.cfg* and fill in all NetBIOS name mappings that are needed for the the local machine.

▶   At the command prompt; type

    nbtstat -R

The static name table from *names.cfg* is loaded automatically whenever NetBIOS starts, e.g. at system startup.

To verify that the mappings from *names.cfg* are known to NetBIOS:

▶   At the command prompt; type

    nbtstat -c

For the example *names.cfg* above, the output of the *nbtstat -c* command is:

```
              Node IpAddress(es): [144.145.100.010] Scope Id: []
                      NetBIOS Remote Cache Name Table
        Name                    Type        Host Address    Life [sec]

_____

TRUSTPDC      <20>        UNIQUE      144.145.101.20      -1
TRUSTPDC      <00>        UNIQUE      144.145.101.20      -1
TRUSTPDC.DOM  <1B>        UNIQUE      144.145.101.20      -1
TRUSTPDC.DOM  <1C>        GROUP       144.145.101.20      -1
TRUSTPDC.DOM  <00>        GROUP       144.145.101.20      -1
OTHERBDC1     <20>        UNIQUE      144.145.102.30      -1
OTHERBDC1     <03>        UNIQUE      144.145.102.30      -1
OTHERBDC1     <00>        UNIQUE      144.145.102.30      -1
OTHERBDC2     <20>        UNIQUE      144.145.102.31      -1
OTHERBDC2     <03>        UNIQUE      144.145.102.31      -1
OTHERBDC2     <00>        UNIQUE      144.145.102.31      -1
```

The *nbtstat* command is fully described below.

> **i** Static mappings from *names.cfg* are stored together with registered and cached name in a name table within the kernel. The number of names that can be stored in this name table is limited by the tuneable parameter NBMAXNAMES. When adjusting this parameter, keep in mind that two or three entries are required for each name with default extensions.

5.1.3.3 Commands used for administering name resolution

The *nbtstat* command is used to display diagnostic information about NetBIOS name resolution. *nbtstat* is especially useful for troubleshooting NetBIOS name resolution problems.

Syntax:

nbtstat { -a | -q } RemoteName [-e Extension]
nbtstat -A IP address
nbtstat [-c] [-n] [-r] [-w]
nbtstat -R

Options:

-a   RemoteName
        Resolves a given NetBIOS name using the configured name resolution algorithm
        and, if found, lists the remote machine's name table.

-q   RemoteName
        Resolves a given NetBIOS name using the configured name resolution algorithm
        and, if found, lists the IP address(es).

-e   Extension
        Represents the 16th Byte of RemoteName in hexadecimal representation. The
        default extension is 0x00.

-A   IP address
        Lists the remote computer's name table given its IP address specified in dotted
        decimal notation.

-c   Lists the name table of remote NetBIOS names, giving the IP address of each
        name. The table contains names from recently received NetBIOS datagrams
        ("name cache") as well as static mappings. Static mapping are recognizeable by a
        "-1" in the "Life" column.

-n   Lists local NetBIOS names (names that were registered on the network by the
        Advanced Server for UNIX).

-r   Shows some name resolution statistics.

-w   Shows the current WINS configuration. The IP addresses as well as the current
        state of both primary and secondary WINS server – if configured – are displayed
        together with the currently used registration type.

-R   Purges the local name table and reloads it from *names.cfg*, if the file exists.

Example output of a *nbtstat -n* command:

```
                    Node IpAddress(es): [144.145.100.150] Scope Id: [ ]
                              NetBIOS Local Name Table
Name                              Type        Status
--------------------------------------------------------------------------------
EXAMPLE                    <20>        UNIQUE      Registered
*SMBSERVER                 <20>        GROUP       Registered
EXAMPLE                    <00>        UNIQUE      Registered
EXAMPLE.DOM                <00>        GROUP       Registered
EXAMPLE.DOM                <1C>        GROUP       Registered
EXAMPLE~X                  <00>        UNIQUE      Registered
EXAMPLE#BROW               <00>        UNIQUE      Registered
EXAMPLE#DMN                <00>        UNIQUE      Registered
EXAMPLE.DOM                <1E>        GROUP       Registered
EXAMPLE.DOM                <1B>        UNIQUE      Registered
EXAMPLE.DOM                <1D>        UNIQUE      Registered
..__MSBROWSE__.            <01>        GROUP       Registered
```

Example output of the command *nbtstat -q domain.dom -e 1c:*

```
NetBIOS name resolution result:
───────────────────────────────
Name:          DOMAIN.DOM     <1C>
IP address:    144.145.111.178
IP address:    144.145.111.233
IP address:    144.145.113.22
```

Occasionally it may be helpful to be able to dynamically add and delete certain NetBIOS names from the internal name tables without reloading the complete *names.cfg* file. This can be accomplished by the *addname* and *delname* commands:

The *addname* command dynamically adds one or more NetBIOS names to the local name table of NetBIOS.

Syntax:

/var/opt/nbrfc/bin/addname <NetBIOS name> <IP address> UN | GR [Ext1[Ext2 ...]]

Options:

All options correspond directly to the syntax of the *names.cfg* file (see section "The names.cfg file"). The only exception is that the list of NetBIOS name extensions is separated by blanks and does not start with a number sign (#).

Example:

```
/var/opt/nbrfc/bin/addname TRUSTEDDOM.DOM 144.145.47.101 UN 1B
```

> **i** Name mappings added with the *addname* command do no longer exist after NetBIOS is restarted. Use the *names.cfg* file if you want to establish permanent name mappings. Please note that the number of names that can be stored in the local name table depends on the NBMAXNAMES parameter.

The *delname* command deletes one or more NetBIOS name from the local name table.

Syntax:

/var/opt/nbrfc/bin/delname <index1> [<index2> ...]

Parameters:

<index1> [<index2> ...]
To specify the NetBIOS names to be deleted, first use the internal *nbrfcdiag -n* command to get a listing of the local name table. Use the internal index from the first column of this list as parameters to the *delname* command.

Note that while the internal *nbrfcdiag -n* command lists both dynamic and static names, the *delname* command can only be used to delete static names (those listed as STATIC).

5.1.3.4   Guidelines for configuring name resolution

Since WINS is the preferred method of name resolution, it is recommended to use WINS whenever possible. This section contains simple guidelines for configuring static name mappings for a particular Advanced Server computer in situations where WINS servers are **not** used. In what follows, "PDC" denotes a Primary Domain Controller and "BDC" denotes a Backup Domain Controller.

Within a domain, a PDC must be able to find all BDCs:

Template: `BDC          nnn.nnn.nnn.nnn UN #0,20`

Within a domain, each BDC must be able to find its PDC:

Template: `PDC          nnn.nnn.nnn.nnn UN #0,20`
                       `PDC.DOM      nnn.nnn.nnn.nnn UN #1b`

(Note that when installing a BDC, the local machine must already be able to find the PDC!)

Before setting up a trust relationsship between two domains, the two PDCs must be able to find each other:

Template: `OTHERPDC     nnn.nnn.nnn.nnn UN #0,20`
                       `OTHERPDC.DOM nnn.nnn.nnn.nnn UN #1b`
                       `OTHERPDC.DOM nnn.nnn.nnn.nnn GR #1c`

If Windows NT servers are part of your domain – either as PDC or BDC – and WINS is not used, keep in mind that similar rules apply for LMHOSTS files. For more information about the LMHOSTS file, see Windows NT Help and the "Microsoft Windows NT Resource Kit Networking Guide".

5.1.4   Configuring NetBIOS Tunable Parameters

On Advanced Server for UNIX computers, NetBIOS services are provided by two STREAMS drivers which are linked to the UNIX kernel during NetBIOS installation. Following is a list of tuning variables which are used to control the behavior of NetBIOS (for the default values refer to the */etc/conf/cf.d/mtune* file). Note that a NetBIOS upgrade installation may change the default values for a tunable parameter in the *mtune* file, but does not change local settings in the *stune* file.

NBMAXNAMES   *default: 140, min: 40, max: 4096*
NBRFCCACHE   *default: 16, min: 0, max: 4000*

NetBIOS maintains an internal name table for mapping NetBIOS names to IP addresses. This internal name table contains

● a list of names owned by the local machine

● a name cache consisting of mappings from recently received NetBIOS datagrams (take NBRFCCACHE entries) and

● a list of static mappings from a *names.cfg* file.

The tuning parameter NBMAXNAMES determines the size of the whole table and NBRFC-CACHE determines the size of the cache. When adapting NBMAXNAMES to large *names.cfg* files, keep in mind that static name mappings configured in the *names.cfg* file occupy two or three entries in the name table if default extensions are used.

> **i** Setting NBRFCCACHE to 0 disables the name cache. It is recommended not to set NBRFCCACHE to a value less than the default.

NBMAXSESS   *default: 256, min: 32, max: 2048*

NBMAXSESS denotes the maximum number of NetBIOS sessions that can be active at the same time.

NBRFCKALIVE   *default: 30, min: 0, max: 1440*

This parameter controls the "NetBIOS Keep Alive" feature (in minutes).

If set to a value greater than 0, NetBIOS sends periodic transmissions on a session, when no other data is being sent for a period of time. If the other end does not respond to these messages, the session is considered broken after certain TCP/IP timers have expired. By default, NetBIOS sends keep alive messages every 30 minutes.

However, in WANs as well as in dial-up networking environments these periodic messages can cause unwanted effects (e.g. periodic dial-up procedures and/or additional traffic). You can then disable these keep alive messages completely by setting NBRFCKALIVE to 0.

NBRFCDGMTIMEOUT   *default: 10, min: 1, max: 60*

This parameter sets the timeout for lost datagrams. Leave changes of this parameter to your field service support.

NBRFCMAXDGMS   *default: 32, min: 32, max: 128*

This parameter sets the size of the internal NetBIOS datagram table. Leave changes of this parameter to your field service support.

NBRFCMAXFRAGS   *default: 10, min: 10, max: 64*

This parameter sets the size of the internal NetBIOS table that is used for temporarily storing fragmented datagrams. Leave changes of this parameter to your field service support.

NBRFCSTATBCAST	*default: 0, 0 or 1*
NBRFCWINSREG	*default: 1, 0 or 1*
NBRFCPRELOAD	*default: 0, 0 or 1*

These parameters control the NetBIOS name resolution. As of Advanced Server for UNIX NetBIOS 4.0 the default name resolution algorithm changed:

NBRFCSTATBCAST old: 1   new: 0

If this parameter is set to 1, NetBIOS responds with static names to clients that queried by broadcasts. This resembles a WINS Proxy using only cached names (not WINS names) to respond to broadcast name queries. Normally, name responses are only returned – e.g. by a WINS Server – if the client queried with a unicast datagram (like a WINS client normally does). However, for older clients this behavior might be useful, e.g. when static names from a *names.cfg* are used to get the functionality of a "static WINS". In WINS environments, this parameter should be 0.

NBRFCWINSREG   old: 0   new: 1

If this parameter is set to 0, NetBIOS uses WINS servers configured in the *wins.cfg* file only for name queries. If this parameter is set to 1, NetBIOS is able to fully act as a WINS client. It does not only name queries, but also registers its local NetBIOS names with a WINS server and does name refreshes and name releases. To configure an Advanced Server computer as a WINS client, set this parameter to 1, and configure primary and secondary WINS server in the *wins.cfg* file.

NBRFCPRELOAD   old: 1   new: 0

This parameter determines the search order for name resolution. If set to 1, NetBIOS searches the internal name table (containing local names, a name cache consisting of mappings from recently received NetBIOS datagrams and a list of static mappings from a *names.cfg* file) **before** trying broadcast name resolution. If the parameter is set to 0, NetBIOS does a lookup in this name table only as a last resort, if all other methods (WINS, broadcasts) failed. In WINS environments, set this parameter to 0 to prevent old or inconsistent name mappings being preferred over WINS names.

As a general rule, set all three parameters to their "old" values if you want name resolution to be done in the old way (broadcasts, LMHOSTS/names.cfg). Set the parameters to their "new" values if you want name resolution to be done mostly by WINS. The latter is recommended and is the default.

To change the behavior of the NetBIOS kernel components:

▶   Change the tuning variables described above using the *idtune(1M)* command.

▶   Build a new kernel using the *idbuild(1M)* command.

▶   Reboot the machine using the *shutdown(1M)* command.

5.1.5   **Configuring NetBIOS Startup Parameters**

Since AS/X V4.0B, the startup options for nbrfcdaemon are presently configured in the *var/opt/nbrfc/conf/nbrfcdaemon.cfg* file. Default is "-l2 -f20 -n". If the file does not exist, it will be created automatically. Changes to this file are not overwritten during an upgrade installation.

The following startup parameters of the NetBIOS daemon can be configured by the administrator:

-n   This option instructs TCP not to wait for ACK of the previous small packet, rather to send the next small packet immediately. The Nagle algorithm is thus disabled. This avoids the delay of waiting for the ACK at the expense of less efficient utilization of the physical medium.

| i | In earlier AS/X versions, this functionality was configured in the "tcp_nodelay" parameter in the lanman.ini file. This parameter is no longer supported. |

| ⚠ | Reliant UNIX-N V5.43C0 still does not support this parameter. You will therefore have to use a single correctional release in this case. For further details, refer to the information supplied in the release notice in the SIreadmeM package. |

-l   <number of outstanding connect indications>
Specifies the maximum number of simultaneously outstanding connect indications. The period of time that normally elapses between the setup being requested and the actual connection being set up is usually quite small, with the result that an additional setup request is generally possible. If the maximum number is reached and the setup requests are tied up for too long, faulty network configurations are often the reason. Please contact your Support Center in this case.
Default: 2, Maximum: 5

-f   <number of preliminary sessions>
Specifies the number of NetBIOS sessions that the NetBIOS daemon always keeps on hold in order to speed up the connection setup. A bottleneck with these preliminary sessions is logged in syslog and also displayed with the *nbrfcdiag -f* command. The parameter can be increased in this case although this ties up additional resources. Your Support Center will be able to tell you the optimal setting. Default: 20

5.2 Guidelines for NFS file systems

If the *UseUnixLocks=1* entry has been set in the Registry, Advanced Server for UNIX
executes record locks in all file systems, including the NFS file system. The default is
UseUnixLocks=0, *UseNfsLocks=0*, *NfsCheck=0*.

Overview:

Parameter	Parameter	Comments
UseNfsLocks=1		The lock or unlock command is always executed, an error message may be passed on to the application. The *NfsCheck=* parameter is ignored.
UseNfsLocks=0	NfsCheck=0	The lock or unlock command is always executed, if an error message appears, it is acknowledged positively.
UseNfsLocks=0	NfsCheck=1	The lock or unlock command is only executed if the file is not contained in the NFS file system. If the file is contained in the NFS file system, the command is not executed, but is acknowledged positively.

- The incorrect locks can cause processes to hang in systems that have not configured a lock manager. These processes cannot be terminated with *kill -9*; in this case the system must be restarted.

- In this case, set the entries *NfsCheck=1* and *UseNfsLocks=0*.

5.3 Connecting Advanced Server for UNIX to Logging

Advanced Server for UNIX has an interface to Logging. If users wish to use Logging it must
be installed and started on the server system.

► Check whether the log files *log3admin* and *log3struct* (for Logging V3.0) contain entries
for Advanced Server for UNIX. If necessary, incorporate them using an editor.

► After you have entered it using the editor, invoke the *log3/bin/log3adm* and *log3/log3new*
commands. In this way, the entries are incorporated from *log3admin* to *log3admin.obj*.

The following sections contain the configuration examples for these files; the
Advanced Server for UNIX entries in the *log3admin* file are highlighted in bold font.

```
.
#
;filename    Kbyte     chng       close
;--------    -----     ----       -----
default    100       5          1     ; this is the default destination
                                      ; file for applications without an
                                      ; explicit  #LOGTYPE declaration.
#LOGFILE
;filename    Kbyte     chng       close
;--------    -----     ----       -----
cms_error  50        2          1     ;    compno 16
cmsreport  50        2          1     ;    compno 17
iocs       50        2          1     ;    compno 33
auto       50        2          1     ;    compno 41
sft        50        2          1     ;    compno 55
datasyslog 50        2          1     ;    compno 0xfffffffe  syslogd
asx        50        2          1     ;    compno 1130010

#LOGTYPE
;CompNo     logfile              repeats    eventrep.
;------     -------    _____
16         cms_error  1          1
17         cmsreport  1          0
33         iocs       1          0
41         auto       1          0
0xfffffffe datasyslog
1130010    asx        1                  0
```

Extract from the file *log3admin* (Logging V3.0)

```
.
.
#STRUCT 3
"\n"
.
.
```

Extract from the file *log3struct* (Logging V3.0)

5.4   Restricting the user's disk space

When configuring disks under UNIX, system administrators can limit the disk space that can be used by "normal" users.
Advanced Server for UNIX is configured by default to allow all free disk space to be used by all AS/X users.
From Version 4.0B, Advanced Server for UNIX can be configured optionally to observe the limit set under UNIX.

Furthermore, Advanced Server for UNIX supports the UNIX "quotas" function, which can be used to restrict the disk space available to users on an individual basis.

> **i**   The "quotas" function is currently only supported by UNIX on ufs file systems.

Since both functions use the same mechanisms under UNIX, the new functionality is likewise controlled by the "UnixQuotas" registry parameter. The following table clarifies the behavior of Advanced Server for UNIX depending on the different settings for the "UnixQuotas" parameter:

Value of UNIXQuotas parameter	Usage of Quotas functionality	Write under user ID of	Disk space usage	Display free area
0	No	"root"	Total free area	Total free area
1	Possible, if supported by operating system	Mapped UNIX user	Reserved area remains free if supported by operating system	Reserved area is not displayed as being free if supported by operating system

UNIX commands are used for "quotas" to allocate the disk space for the respective UNIX users. Should you require information on this topic, please refer to the UNIX system documentation ("System Administrator's Guide") or the example given below.

Configuring the disk space restriction

To configure the disk space restriction, you should proceed as follows:

1. Change the value of parameter "UnixQuotas" within the registry to "1".

   Note that this will automatically affect certain other parameters as well. For more information, please refer to the section "File Service Parameters Entries" in chapter "Advanced Server Registry".

2. Stop Advanced Server for UNIX.

3. Start Advanced Server for UNIX.

The restrictions configured under UNIX are now active for the Advanced Server for UNIX users. If a user reaches the set limit a message is issued to the effect that there is insufficient disk space available and no further data can be copied to the specified location.

Mapping Advanced Server for UNIX users to UNIX users

UNIX quotas can really only be used properly if a UNIX user is assigned to each Advanced Server for UNIX user. This is predetermined by setting the following parameter in the registry:

```
CreateUnixUser=1
```

If this parameter has the value *0*, all Advanced Server for UNIX users are mapped to a UNIX "lmworld" user. In this case, the total disk space quota for all Advanced Server for UNIX users must not be exceeded, i.e. if one Advanced Server for UNIX user exceeds the permitted capacity this blocks all other Advanced Server for UNIX users at the same time.

If required, you can view and change the mapping of Advanced Server for UNIX users to UNIX users with the following command:

```
/var/opt/lanman/bin/mapuname
```

Example of configuring UNIX quotas:

Prerequisite: Your Advanced Server for UNIX must have the following registry parameters set: *CreateUnixUser=1* and *UnixQuotas=1*. The domain name is e.g. *domain1*. To perform the configuration now, you should proceed as follows:

► Create an Advanced Server for UNIX user "user1":
```
net user user1 password /add
```

► Check the mapping to the UNIX user:
```
/var/opt/lanman/bin/mapuname domain1:user1
```
The respective UNIX user is then output: `user1`.

► Create a directory for this user:
```
cd /home
mkdir user1
chown user1 user1
chgrp DOS---- user1
chmod 775 user1
```

► Share the directory:
```
net share user1=c:/home/user1
```

► Assign rights for the user "user1":
```
net perms c:/home/user1 /grant user1:fullcontrol
```

► Now configure "quotas" under UNIX for the */home* directory:

► In the */home* directory, create a blank file called "quotas":
```
> quotas
```
  – Set the limits for the UNIX user "user1":
```
edquota user1
```
  – A temporary file with the following contents is opened using the *vi* editor.
```
fs /home blocks (soft = 0, hard = 0) inodes (soft = 0, hard = 0)
```
  – Enter the limits, for example:
```
fs /home blocks (soft = 11000, hard = 15000) inodes (soft = 0, hard = 0)
```
  – Exit the editor and save the file.

► Enable "quotas" support for the directory. In the
   /etc/vfstab file, change the line for */home* for example:
```
/dev/ios0/sdisk000s5  /dev/ios0/rsdisk000s5 /home ufs 0  yes  rw to:
/dev/ios0/sdisk000s5  /dev/ios0/rsdisk000s5 /home ufs 0  yes  rq
```

► Activate the change: `quotaon -a`

► The disk space restriction has now been configured successfully, and can be checked with the `quota -v user1` command. Users can view their own disk space under UNIX with the `quota -v` command.

5.5 Configuring printers on the UNIX system

Advanced Server for UNIX supports interworking with the AT&T$^{®}$ standard spooler and the
Reliant UNIX spooler. For this purpose, the following interfaces are available:

Keyword	Spool system
ATTHPI SPOOLV4	Standard spooler (AT&T high performance interface) SPOOL V4.2 and Xprint V5.x, referred to in the following text as SPOOL V4.x (for all UNIX systems)

The selectable spoolers are displayed during installation with the keywords. Select a
spooler for Advanced Server for UNIX, which is then configured automatically.

> **i**
>
> ● You may only use one spooler at a time.
>
> ● You may only select a spooler if it is already installed on your system.
>
> When printing with Advanced Server for UNIX, the print data is already processed
> with the PC applications. For this reason, the spooler must pass on this print data
> "transparently" to the respective printer; it may not modify it under any circum-
> stances. To do this, the spooler interface for Advanced Server for UNIX passes on
> the print job in raw mode. Therefore, you can use every printer on the UNIX system
> for Advanced Server for UNIX as long as it is supported by the PC application.

Before you can use a spooler with Advanced Server for UNIX, you must configure printer
classes / groups and printers. You may only use the printers with Advanced Server for UNIX
if it is possible to print from UNIX with the configured printers.

5.5.1 Configuring AT&T spooler

This section explains how to set up the AT&T spooler with the UNIX utility program *SYSADM*
for Advanced Server for UNIX. For further information on the AT&T spooler, please refer to
the manual "SINIX V5.43" – "AT&T Spooler".

▶   Start *SYSADM* and select *Printers-Line Printer Configuration and options*. Then select
ADD.

▶ Enter the following data:

Printer name: asxp_hpl
System name: server1
Printer type: standard
Device or address: /dev/term/com1

> **i** In order to prevent problems occurring with the net commands under MS-DOS, the printer and printer class names must consist of a maximum of eight characters. Use lowercase and/or the characters -, _ !

▶ Select <classes> and <ADD> under the *Line Printer Configuration and options* menu to create a new printer class.

> **i** The printer class can also be created using the Advanced Server for UNIX commands instead of the UNIX commands.

▶ Enter `class_1`, for example, as the name of the new printer class.

▶ Activate the printer and printer class using the following commands:

```
enable asxp_hpl
accept asxp_hpl
accept class_1
```

▶ Check the printer using the command

```
lpstat -a
lp -dclass_1 /etc/hosts
```

When sharing the printer, link the name of the printer (here *asxp_hpl*) with the sharename.

For information on sharing a printer with Advanced Server for UNIX, please refer to the "Concepts and Planning" manual.

5.5.2 Configuring SPOOL V4.x

The following sections explain how to set up SPOOL V4.x for Advanced Server for UNIX. For further information on SPOOL V4.x, please consult the "SPOOL V4.2".

The example below shows the steps involved in setting up SPOOL V4.x for a HP Laserjet printer:

● set up spool system

● set up supervisor

● add printer to the supervisor

● add printer group

Setting up the spool server

The spool server administers several supervisors and the jobs that you have processed. Among other things, it distributes the print jobs to the different supervisors.

► Log onto the system as system administrator *root*.

► Check whether SPOOL V4.x has been started using *xpstat* for example; if necessary, start it with:

```
xpstart
```

> **i** The name of the spool server is returned to the client by means of a job ID for an executed print job, for example. For accurate identification, the spool server must be assigned a name with a maximum of 7 characters. Use the lowercase letters and/or the characters -, _ !

► Set up the spool server *srv_asx* for Advanced Server for UNIX server:
```
xpadd -srv srv_asx
```

► Activate this spool server with:
```
xpchange -srv srv_asx -stACTIVE -siON -soON
```

You can also use an existing spool server for AS/X.

Setting up the supervisor

The supervisor is responsible for printing jobs which it receives from the spool server. The jobs are printed on printers which are controlled by this supervisor.

► Add the supervisor *spv_asx* to the spool server *srv_asx*:
```
xpadd -spv spv_asx -se srv_asx
```

► Activate the supervisor with:
```
xpchange -spv spv_asx -stACTIVE
```

You can also use an existing supervisor for AS/X.

Adding the printer to the supervisor

A supervisor can manage several printers with different printer drivers (e.g. PostScript® or HP Laserjet®).

► Add a printer (e.g. with the name *asxp_hpl* for HP Laserjet printer driver) to the supervisor *spv_asx*, in which case the PCL (Printer Control Language) *HP-LASERJET* should be set:
```
xpadd -dev asxp_hpl -da <devicename> -ho <host name> -pc HP-LASERJET -su
spv_asx -aa
```

You do not need to specify the supervisor with -su. In this case, spool will use the default supervisor.

● The printer is activated automatically as soon as the system starts up by means of the option -*aa*.

▶ Specify the local host name for a local spooler; in the case of a spooler, which is accessible over the network, specify the host name of the remote system in the network.

> **i** In order to prevent problems occurring with the net commands under MS-DOS, the printer and printer class names must consist of a maximum of eight characters. Use lowercase and/or the characters -, _ !

▶ Activate the printer *asxp_hpl* with:
```
xpchange —dev asxp_hpl —st ACTIVE —si ON —so ON
```

Checking the printer

▶ Print the */etc/hosts* file, for example, on the *asxp_hpl* printer using:
```
xpadd —de asxp_hpl —dr /etc/hosts
```

Advanced Server for UNIX always spools in the print data which comes from the PCs transparently (default). This spool-in procedure is comparable to the *xpadd -job -dr* <file> *-de* <printer group> *-fc 1 -rw* command.

● If print data is not printing out as required, check whether the same file that has been prepared for printing can be printed to the required printer group from UNIX using the *xpadd* command.

For information on how other parameters can be set, please refer to the section "Changing parameters for a printer queue".

Setting up the printer group

In order to share the printer with the Advanced Server for UNIX server as a printer queue, you can set up a printer group:

> **i** In order to prevent problems occurring with the net commands under MS-DOS, a printer group name must consist of a maximum of eight characters. Use lowercase and/or the characters -, _ !

▶ Set up the printer group *group_1* for example with the *asxp_hpl* printer:
```
xpadd —dgr group_1 —dl asxp_hpl
```

You can include several printers with the same printer driver (e.g. HP Laserjet) to form a single printer group. A print job, which is sent to this group, is processed by the first free printer in this group. For further information, please consult the manual "SPOOL V4.2" – "User and Administrator Guide".

Setting the priority for print jobs from SPOOL V4.x

The priority for print jobs from SPOOL V4.x **cannot** be modified with the
net print <queue> */priority:*<number> command.

● To set the priority, use the *net print* <queue> */parms:"*... *-pr* <number> *..."* command. If
nothing is set, Advanced Server for UNIX prints with the priority for *root* (default *1*).

5.5.3   Optimizing performance with Spool V4.x

In large SPOOL network configurations with many objects, performance problems can
arise in connection with Advanced Server for UNIX. When printing, the *lmx.srv* server
process assigned to the PC can accept more jobs in parallel. When querying status infor-
mation, e.g.with *net print*, the *lmx.srv* server process allocated to this command works exclu-
sively for this job, and other PCs are prevented from accessing files and from printing
for several seconds.

In order to restrict delays in working with SPOOL V4.x on only one PC with Advanced
Server for UNIX V4.0, you can change the configuration of Advanced Server for UNIX
in such a way that each PC receives its own server process. This is an acceptable solution
in particular for smaller configurations.

To do this, change the settings in the "Process Parameters Entries" of the Registry of the
Advanced Server for UNIX for the keys *MaxVCPerProc* and *MinVCPerProc* to "1".

In order to obtain a separate process for each PC, stop and start the server with the
commands:

```
net stop server
net start server
```

i	This solution generates a large number of processes. If this causes problems, please contact your Support Center for optimum partitioning.

5.5.3.1   Large SPOOL V4.x configurations

In large SPOOL V4.x configurations with a large number of printers and printer groups
and a large number of jobs in the queues, timeout problems may occur on the clients. For
example, the Windows Print Manager only waits a certain length of time for the answer
from the server; after this time has elapsed an error is returned.

To avoid problem like these, there is a parameter in the "Parameters Entries Section" of the
Registry: "CallXpstatDev". This parameter controls wheather the device status of Spool
V4.x is queried or not. The default is set to "not query the device status".

i	Prevent the number of print jobs in the printer queue from increasing. This problem is caused by stopping the queue or by long term printer problems.

5.6 Configuration for shared client printer

In the case of the shared client printer, the print data is first accepted by the host spooler. The print data is then transferred to the client whereby a distinction is made between printing via the

● TSR program (Terminate and Stay Resident) *clispool* (or *clipcach*) for MS-DOS clients with LAN Manager V2.2

● other servers and clients that can share the printers.

Shared client printer via TSR program

Advanced Server for UNIX reports after spooler acceptance on the relevant client to the TSR program (terminate and stay resident) *clispool* (or *clipcache*) that the print data is ready for the PC printer under a specific sharename.

On the client, *clispool* sets up a connection with the informed server resource using the *net use* command. The print data waiting on Advanced Server for UNIX is made available to the PC program *print* via this connection.

Shared client printer via other servers and clients

> **i** For information on how to share a printer for the shared client printer on a server or a client, please refer to the relevant manuals.

5.6.1 Setting up the shared client printer

This section contains an example for setting up the printer queue for shared client printer and share it with Advanced Server for UNIX.

The Advanced Server for UNIX commands *addclipr* and *delclipr* are used for this.

5.6.1.1 Addclipr

Purpose:

The addclipr command is used to add an Advanced Server client printer device to the configured spooler.

Syntax:

addclipr   clientname printername printertype [clienttype [sharename]]

where:

clientname   specifies the network name of the client printer computer to which the printer is attached.

printername   specifies the printer destination name to be added to the configured Spooler.

printertype   specifies the printer as being of this type.
The *printertype* is used to extract data from the *terminfo* database.
The parameter must be an entry in the *terminfo* database.

> **i** Not all printers are available for Advanced Server for UNIX on some UNIX systems. If you cannot use the required printer type, enter *standard*.

clienttype   is either CLIPR or PRSRV. The default is CLIPR with a client on which clispool or clipcach is running. With PRSRV, select any system that can make the "shared printer" resource available, for example Windows for Workgroups, Windows 95/98, Windows NT, or a UNIX Server running Advanced Server for UNIX.

> **i** Please note the section "PRSRV option guidelines" below.
> The *sharename* has to be entered if the clienttype is PRSRV.

Comments:

The addclipr command configures the Advanced Server and the configured spooler to send print jobs from the Advanced Server computer using the UNIX spoolin command. It does not share the printer for network use. To enable network access to the client printer, a shared printer queue must be created using the *net share* command.

The command creates a device for the shared client printer in the spooler administration called printername. If printername is not specified, clientname is used as the name of the printer. After successful completion, UNIX users can print to the client printer by issuing the following command:

For the LP spooler: lp -d printername filename

For Spool V4.x: xpadd -job -de printername -dr filename ...

Examples:

To add an HP LaserJet printer attached to the client computer named *pc2* via the CLIPR interface, type the following command:

```
addclipr pc2 "" hplaserjet
```

To add a postscript printer that is attached to the client computer named *pc3* and which is shared with the share name *printer3* (PRSRV interface), type the following command:

```
addclipr pc3 "" POSTSCRIPT PRSRV printer3
```

The device connection for the shared client printer is thus entered in the spooler administration; you have now created the printers, e.g. *pc2*.

You can now use this printer from UNIX with following commands:

for Spool V4.x: `xpadd −job −de pc2 −ct SIMPLE −dr...`

for the LP spooler: `lp −d pc2 ...`

5.6.2 Delclipr

Purpose:

The delclipr command is used to delete an Advanced Server client printer device from the configured Spooler.

Syntax:

delclipr   printername

where:

printername   specifies the client printer destination name recognized by the configured Spooler.

Comments:

The delclipr command removes all of the client printer configuration information from the Advanced Server and the configured Spooler. The print destination printername is removed from the configured Spooler. If an Advanced Server shared printer queue exists with print-ername as the only member, the shared printer queue is also deleted.

Example:

To delete the client printer pc2, type

```
delclipr pc2
```

PRSRV option guidelines

Username and password

- The shared printer configured with *PRSRV* should **not** have a password. The filter program configured on Advanced Server for UNIX then logs on without a password with the username *<system name>.cli* in the domain in which the server has been set up. If, for example, the system name of a server is displayed with *uname -n* as *server1*, the filter program logs on with *server1.cli*.

- This username **must not** exist in the domain.

- If the system is a server (OS/2, Windows NT or UNIX), a user with this username **must not** be located in the local account database. Only then the filter program will receive the rights for the user *GUEST* in the user group *GUESTS*.

If a user with this username exists already, or if a password has been configured for the shared printer, the following steps must be carried out:

▶ Set the correct values for the *DOMAIN*, *USERNAME*, and *PASSWORD* parameters in the */var/opt/lanman/clipr/config/<Client name>* file.

- Please note that in the case of an OS/2 server, the rights for the shared printer are **not** set automatically for *USERS* and *GUESTS*. Furthermore, blank usernames are **not** accepted here.

Using these entries the filter program of Advanced Server for UNIX can log on in the domain.

Stopping the PC or terminating the Print Manager

⚠ If the PC is to be switched off or the Print Manager is to be closed, the associated "spool-out" must be stopped **beforehand** on the spool system.
To do this, use *xpchange -dev <device> -so OFF* for example *(*for Spool V4.x), or *disable <device>* (for AT&T Spool).

If an error occurs, Advanced Server for UNIX or the spool system automatically sets the printer to *disabled*. The print job for which the error was detected cannot be backed up; it must be repeated. All other print jobs remain in the print queue until the error has been recovered. If the error has been recovered, you can start the associated "spool-out".

► To do this, use *xpchange -dev <device> -so ON*, for example (for Spool V4.x), or *enable <device>* (for AT&T Spool).

5.7 Activating Advanced Server for UNIX

5.7.1 Starting NetBIOS

Manual

You can start the NetBIOS administration process manually with *nbrfc start*.

Automatic

During installation, a link is set up with *rc2.d* for starting the NetBIOS administration process automatically.

5.7.2 Start Advanced Server for UNIX (with NetBIOS)

The following commands are available for starting Advanced Server for UNIX:

– *asx start* (all processes, including NetBIOS and WINS, if configured)

– *net start server* (the server only)

– */etc/init.d/ms_srv start* (the server only; in the background)

asx start command

The *asx start* command is used to start Advanced Server for UNIX, the NetBIOS adminis-tration process *nbrfcdaemon* and all other processes (e.g. for the services).

net start server command

You can start the Advanced Server for UNIX processes of the server with the *net start server* command if you have stopped the server with *net stop server* beforehand for example. You can thus activate a new configuration for example.

/etc/init.d/ms_srv start

The */etc/init.d/ms_srv start* script is used to start all server processes in the background; there will be a delay before connections with Advanced Server for UNIX are set up.

5.7.3 Sharing resources

For information on how to share resources, please refer to "Concepts and Planning" manual.

5.7.4 Terminating Advanced Server for UNIX

The following commands are available for terminating Advanced Server for UNIX:

– *asx start*   (all processes, including NetBIOS and WINS)
– *net start server*   (the server only)
– */etc/init.d/ms_srv start* (the server only; in the background)

asx stop command

The *asx stop* command is used to terminate Advanced Server for UNIX, the NetBIOS administration process and other processes which were initiated using the *asx start* command.

⚠ This command stops the server without further queries even if connections still exist!

net stop server command

You can terminate the Advanced Server for UNIX processes of the server using *net stop server* **without** terminating the other processes that have been started with *asx start* at the same time (e.g. NetBIOS). In this case, you should only start the Advanced Server for UNIX processes with net start server. You can thus activate a new configuration for example.

/etc/init.d/ms_srv stop

The */etc/init.d/ms_srv stop* script is used to terminate all server processes (in the background).

⚠ If you stop the server in this way, all connections are terminated **without** prior consultation. This could lead to data loss!

5.7.5 Terminating NetBIOS

Manual

You can stop the NetBIOS administration process manually with *nbrfc stop*.

Automatic

During installation a link is set up with *rc0.d* for stopping the NetBIOS administration process automatically.

5.7.6 Stopping and starting individual services

The services of Advanced Server for UNIX are started with *asx start* for example. You can stop and start the following Advanced Server for UNIX services separately:

Start command	Stop command	Service
net start timesource	net stop timesource	Time source service
net start netlogon	net stop netlogon	Logon service
net start alerter	net stop alerter	Alert service
net start replicator	net stop replicator	Replicator service
net start netrun	net stop netrun	Netrun service
net start browser	net stop browser	Browser service
net start snmp	net stop snmp	SNMP service (if installed)
net start wins	net stop wins	WINS service*

ℹ *It is recommended to use *wins start* and *wins stop* to start and stop the WINS service!

5.7.7 Status display of the Advanced Server for UNIX processes

You can display the status of the Advanced Server for UNIX and NetBIOS processes using the *asx status* command.

5.8 Adapting the configuration

For further information on the Advanced Server for UNIX configuration refer to chapter "Advanced Server Registry" and chapter "Lanman.ini File".

5.9 Setting up a UNIX development environment

Advanced Server for UNIX with its API (application programming interface) supports the development of programs which access the communication mechanisms, LM named pipes, and mailslots, or which take on administrative tasks. The declaration files and libraries listed in the following table are used in this case.

Path, file	Contents
/var/opt/lanman/include	Directory of include files
/var/opt/lanman/lib	Location of Advanced Server for UNIX libraries
/usr/include/lmx	Symbol link to */var/opt/lanman/include*
/usr/lib	Contains symbolic links to the libraries in */var/opt/lanman/lib*

> **i** The "API Reference" manual and the API manual pages contain detailed descriptions of declaration files.

> ⚠ It is recommended to use the path to */usr/lib* and */usr/include/lmx* to compile and link your application.

5.9.1 Call options for compilers and linkers

If you wish to use the communication mechanisms of Advanced Server for UNIX for development purposes, you must include the necessary declaration files required for the API function in the source texts. Similarly, the required libraries must be included when linking the object files. The following table contains the options for calling the compiler and linker:

	Call	Meaning
Compiler	`-I/usr/include/lmx`	Advanced Server for UNIX declaration files
Linker	`-llmx`	Advanced Server for UNIX library
	`-lnsl`	Shared library for TLI
	`-ldl`	For dynamic linking
	`-lmproc`	UNIX system library
	`-lext`	UNIX system library
	`-lrpcapi`	Advanced Server for UNIX library
	`-lmsrpc`	Advanced Server for UNIX library
	`-ltask`	Advanced Server for UNIX library
	`-lsam`	Advanced Server for UNIX library
	`-lasusec`	Advanced Server for UNIX library
	`-lasulang`	Advanced Server for UNIX library
	`-lCrun`	UNIX system library

i   The shared libraries are also used by the Advanced Server for UNIX processes.

Example:

The source file *apitest.c* contains API calls (e.g.*DosMakeNmPipe()*). This source file is compiled and linked using the program *make* with the following *makefile*:

```
LIBS=-llmx -lasulang -lnsl -ldl -lmproc -lext

apitest: apitest.o
        cc -o apitest.o $(LIBS)

apitest.o: apitest.c
        cc -c apitest.c -I/usr/include/lmx
```

i   The number of Advanced Server for UNIX libraries linked to the object may vary with the API functions you are using. All possible libraries are listed in the table above.

6 Administration guidelines

This chapter contains guidelines for

- changing server attributes
- sharing a CD-ROM drive
- saving configuration files
- processing the printer queue
- administering using the net admin command

6.1 Changing server attributes

You can change the following server attributes after the installation:

- Server name

  The program *setservername* is available for changing the name of an Advanced Server.

- Domain name

  The program *setdomainname* is available for changing the name of an Advanced Server domain.

- Server role

  With the program *promote* you can change the server role without re-initializing an existing domain.

- Server name, Domain name, Server role

  The program *joindomain* is available for configuring an Advanced Server into a new domain or re-initializing an existing domain.

- Spooler interface

  With *setspooler* you specify a spooler for the Advanced Server for UNIX.

● Output language

With *setlang* you can change the output language of *net* commands, *elfread* and the *EventViewer*.

● Domain language

With *setdomainlang* you can change the language of predefined objects within a domain.

▶ You must be logged on as the system administrator root to change server attributes.

▶ The utility programs for changing the server attributes need to stop the server. Therefore, inform all users using resources of this server.

▶ These programs are described in the online manpages for Advanced Server for UNIX.

6.2 Sharing a CD-ROM drive

If your UNIX system has a CD-ROM drive, you can also share it for workstations. To do this, carry out the following steps:

▶   Using the *mount* command, incorporate the CD-ROM drive in the UNIX file system, for example, use the commands:

```
mkdir /cdrom
chmod 777 /cdrom
mount -F hs -o dos /dev/ios0/sdisk005s0 /cdrom
```

i

- The devicename for the CD-ROM drive varies depending on the UNIX system.

- Most of the CD-ROMs have the *high sierra* file system type for which you enter the required driver on RM systems using the parameter *-F hs*.

- In the example a directory (*/cdrom*) has been generated for slice 0 only. Create another directory for each other slice as required and incorporate it into the UNIX file system using the *mount* command.

- Advanced Server for UNIX generally only processes filenames which do not contain **any** uppercase letters. The filenames are converted to lowercase letters using the *-o dos* parameter. Check whether this parameter is set if errors occur. You could also configure Advanced Server for UNIX is such a way that both uppercase and lowercase usage is possible. To enable this, set the following parameter in the registry: *MixedCaseSupport=1*.

- Share the CD-ROM drive using the *net share cdrom=c:/cdrom* command.

Users now have read access to the CD-ROM drive from their workstations using the *net use i: \\server1\cdrom* command, for example.

i   You **cannot** remove the CD-ROM from the drive **before** you have removed the CD-ROM drive from the UNIX file system with the *umount* command!

6.3 System data backup

The AS/X databases are open while Advanced Server for UNIX is running. In order to ensure that all configuration files are consistent, you must stop Advanced Server for UNIX with the *net stop server* command **before** carrying out a data backup.

> ⚠ There are also hidden files and special files in the directories below */var/opt/lanman*. To back up the complete tree use e.g. the *cpio* command. Do **not** use the *cp* command - it will hang on special files.

6.4 Processing the printer queue

The section explains the spoolers for which you can process the printer queue with restrictions.

6.4.1 SPOOL 4.x or Xprint

6.4.1.1 Stopping and restarting printer queues

You can stop a printer queue for Advanced Server for UNIX using the command *net print /hold*. This sets **all** Advanced Server for UNIX print jobs to the status *SUSPEND*, including jobs which have been newly spooled via Advanced Server for UNIX. Print jobs spooled via *xpadd* are not affected.

The stopped printer queue is restarted using net print <printer queue> /release.

> **i** By default, Advanced Server for UNIX printer jobs have the sender root. This can be viewed by entering the xpshow command.
>
> You can also configure Advanced Server for UNIX for spooling under the user ID of the AS/X user (see the *SpoolinAsUnixUser* registry parameter in the section "Parameters Entries").

6.4.1.2 Changing parameters for a printer queue

You can change or set print parameters for a SPOOL V4.x printer queue from Advanced Server for UNIX.

This is done using the command *net print <printer queue> /parms:"<xpadd parameter>"*.

The *<xpadd parameter>* parameters correspond to the parameters for the *xpadd* command in SPOOL V4.x. They are described in the SPOOL V4.x manuals.

The default setting for *<xpadd parameter>* is *-fc 1 -rw*. In order to set the parameters to the default setting, call the following command:
```
net print <printer queue> /parms:""
```

In order to set new parameters, it is necessary to specify at least one parameter, e.g. *net print <printer queue> /parms:"-fc 1"*

> **i**
> - Advanced Server for UNIX reserves the following parameters for its own processing. For this reason they **cannot** be specified:
>   *-de*, *-dr*, *-ev*, *-jc*, *-na*, *-nd*, *-nm*, *-rm*, *-st, -jt*
>
> - If a separator page has been configured, the *-js* parameter cannot be used.
>
> - Each spooler has different parameters. For this reason, when switching the configured spooler, it is necessary to first delete the queues for the old spooler.

6.4.1.3 Stopping and restarting print jobs

Print jobs can be stopped and restarted using the commands *net print <job#> /hold* and *net print <job#> /release*. The status of the specified Advanced Server for UNIX print job is set to *SUSPEND* or *WAIT*.

> **i**
> These functions are only effective on print jobs from corresponding users. A user with administrator permissions can influence all print jobs.

6.4.1.4 Status messages from SPOOL via Popup

If the printer device in SPOOL has the status *Device error*, Popup does not send any message about a print job error or printer error to the PC that sent the job.

6.4.1.5 Identifying print jobs with Job ID

In the SPOOL status messages, Popup specifies the *local job ID* for the explicit assignment of the print job (for *pause* and *continue*).

In messages concerning the status of print jobs (*canceled* and *printed*), Popup currently displays only the *global job ID*. As soon as SPOOL V4.x sends the *local job ID* for this situation, Advanced Server for UNIX is adapted accordingly.

6.4.1.6   Displaying the order of print jobs

With SPOOL job management, Advanced Server for UNIX may not display the correct processing order of print jobs. This situation can arise if, for example, individual jobs are deleted from the printer queue and new jobs are then spooled in.

The actual processing order can be displayed using the command *xpstat -job* in the *Rank* field.

6.4.1.7   Changing the order of print jobs

The *net print <job#> /first* command can be used to set a print job to the SPOOL status *TOP*.

| i |

● When a printer queue is stopped (*HOLD* status), all print jobs, including those with the status *TOP*, are set to the status *SUSPEND*. After restarting the printer queue, all print jobs are set to the status *WAIT*.

● Print jobs **cannot** be set to the status *TOP* when a printer queue is stopped. No error message is output to this effect.

The *net print <job#> /last* command is not implemented for the SPOOLV4 interface.

6.5   Administering using the net admin command

This command can be used to administer the **specified** server. For example, if the *backup_2* server is the backup domain controller and *primary* is the primary domain controller, the command
net admin \\backup_2 /command <command>
can only be used to execute commands affecting the *backup_2* server.

In this example, due to a lack of access rights, it is not possible to execute the command *net user <username> <password> /add*, as this command does not relate to the backup domain controller *backup_2*, but to the primary domain controller *primary*. In order to execute the command on the primary domain controller, use the command
net admin \\primary /command <command>.

7 Tools for special tasks

Advanced Server for UNIX contains tools for the system administrator, which need only be used in special cases. These tools are described in the sections that follow in relation to particular application scenarios. It is recommended that you first of all read the description of the PC tools and then the description of the tools for NetBIOS, as well as other system administration tools. Finally you should read the information provided in relation to support high availibility configurations.

7.1 PC tools

The following tools are contained in the *DOSUTIL* resource:

7.1.1 Searching for the Master Browser for a domain in a subnetwork (findbrow.exe)

This tool helps you to find the Master Browser in a subnetwork. This is of benefit to the system administrator when searching for errors.

Syntax:

`findbrow.exe` <WorkGroup>|<Domain>

An example of program output is given below:

```
Master Browser found on NetBIOS adapter no '0'
The Master Browser's adapter address : 00c095ec91ee
The following names are available:
NUM        Name                                                        Cat. State
────────────────────────────────────────────────────────────────────────────────
01 CLIENT1'''''''<20>                                                   UN reg
02 CLIENT1'''''''<00>                                                   UN reg
03 DOMAIN1'''''''<00>                                                   GR reg
04 CLIENT1'''''''<03>                                                   UN reg
05 DOMAIN1'''''''<1e>                                                   GR reg
06 USER1''''''''''<03>                                                  UN reg
07 DOMAIN1'''''''<1d>                                                   UN reg
08 <01><02>__MSBROWSE__<02><01>                                        GR reg
```

The display shows the NetBIOS name table of the machine which is the master browser for
DOMAIN1 in the current subnetwork - in this case the machine is called *CLIENT1*.

The master browser of the domain is identified by means of the name <Name>''<1d> (in
this example DOMAIN1 <1d>).

7.1.2 Retrieving information on clients (lmgetinf.exe)

This tool provides information on the client from which it was called. This information is used
for diagnostic purposes by the support centers.

Syntax:

`lmgetinf.exe`

Output parameters:

The output of the tool provides some internal information on the redirector used, for
example the root directory, the computername, the user name, and the domain name.

The example below shows the output:

```
NetWkstaGetInfo returned 0
    LanMan Root     : C:\WINDOWS
    Computer Name   : CLIENT1
    User Name       : USER1
    Lan Group       : DOMAIN1
    LanMan Version  : 2.51
    Logon Server    :
    Workheuristics  : (null)
    SessionTimeout  : 45
    Char Wait       : 0
    Char Time       : 0
    KeepConnections : 600
    KeepSearch      : 600
    Max Threads     : 6
    Max Commands    : 6
    NumWorkBuf      : 2
    SizeWorkBuf     : 4096
    MaxWorkCache    : 0
    SizeError       : 0
    NumAlerts       : 0
    NumServices     : 3
    ErrlogSize      : 0
    PrintBufTime    : 0
    NumCharBuf      : 0
    SizeCharBuf     : 0
    Mailslots       : 1
    Char Count      : 0
    wki0_reserved_1 : 0
    wki0_reserved_2 : 0l
    wki0_reserved_3 : 0l
    wki0_reserved_4 : 0
    wki0_reserved_5 : 0
    wki0_reserved_6 : 0l
```

7.2 Tools for NetBIOS

The following scripts are used for NetBIOS administration.

7.2.1 /var/opt/nbrfc/bin/findbrow

This tool helps you to find the Master Browser in a subnetwork for a given domain or workgroup. If found, it lists the master browser's name table.

In contrast to the PC tool of the same name, the UNIX *findbrow* command can locate a Master Browser both within a local and remote subnetwork.

This is of benefit to the system administrator and to the support centers when searching for errors.

The *findbrow* program is based internally on the NetBIOS *nbtstat* program and therefore uses the same output format.

Syntax:

```
findbrow [ -b <broadcast_address> ] <name>
```

−b <broadcast_address>

> Search within a certain remote subnetwork indicated by <broadcast_address>
> given in dotted decimal notation.
> The default is to search within all locally configured subnetworks as indicated
> by *nbconfig -i*.

<name>   The name of the domain or workgroup.

An example of program output is given below:

```
# ./findbrow -b 111.111.255.255 domain1
```

```
 NetBIOS Remote Machine Name Table

   Name                Type       Status
 _____

 SERVER1         <20>  UNIQUE     Registered
 SERVER1         <00>  UNIQUE     Registered
 *SMBSERVER      <20>  GROUP      Registered
 DOMAIN1         <00>  GROUP      Registered
 DOMAIN1         <1C>  GROUP      Registered
 SERVER1~X       <00>  UNIQUE     Registered
 SERVER1#DMN     <00>  UNIQUE     Registered
 DOMAIN1         <1E>  GROUP      Registered
 SERVER1#BROW    <00>  UNIQUE     Registered
 DOMAIN1         <1B>  UNIQUE     Registered
 DOMAIN1         <1D>  UNIQUE     Registered
 ..__MSBROWSE__.<01>  GROUP      Registered

 MAC Address = 00-00-00-00-00-00
 IP Address  = 111.111.111.111
```

The display shows the NetBIOS name table of the machine which is the master browser for DOMAIN1 in the corresponding subnetwork - in this case the machine is called SERVER1, a primary domain controller.

The master browser of the domain is identified by means of the name "<Name> <1d>" (in this example "DOMAIN1 <1d>").

7.2.2 /var/opt/nbrfc/bin/mv_names

The *mv_names* command is used during an update installation of the *nbrfc* package to convert the configuration of the name table. The NetBIOS name mappings contained in the *[NBRFC]* section of an old style *nbrfc.cfg* configuration file (used by NetBIOS versions <=3.5A) are written to the *names.cfg* file. The script is invoked automatically by the installation program, but it can also be used manually.

Syntax:

```
mv_names  [ <pathname> ]
```

Parameters:

pathname The path name of the file which should be used to extract name mappings. If <pathname> is not given */var/opt/nbrfc/nbrfc.cfg* is used by default.

> **i** The */var/opt/nbrfc/nbrfc.cfg* file is copied to the */tmp* directory during removal of an old *nbrfc* package. If you have a copy of this file, you can invoke this command at any time in order to convert the name table.

Sample names.cfg file:

```
                SERVER1 144.145.111.71  UN #20,03,00
                CLIENT1 144.145.123.5   UN #20,03,00
```

7.2.3 /var/opt/nbrfc/bin/names2lm

The *names2lm* command is used to convert a file containing NetBIOS-name-to-IP-address mappings in *names.cfg*-format into the format of an LMHOSTS file usually used by Microsoft networking components. LMHOSTS format is needed to import static mappings into a WINS database. The command is invoked automatically during installation - it creates the file *names.imp* -, but it can also be used manually at any time.

Syntax:

```
names2lm -d
```

```
names2lm <names_file> <lmhosts_file>
```

Options and Parameters:

`-d`	Use default names
`<names_file>`	Input file name (should contain name mappings in *names.cfg* format).
`<lmhosts_file>`	Output file name in LMHOSTS format (ready for being imported into a WINS database).

i	Please inspect the list of static NetBIOS name mappings generated by names2lm carefully before using NT WINS manager to import them into a WINS database.
	As a rule, you should keep the number of static mappings within WINS as small as possible and use them only for important computers which are not WINS-aware. It is not recommended to use static mappings for WINS enabled clients.

7.3 System administrator tools

The first section contains an overview how access permissions are managed in Advanced Server for UNIX. The following scripts are required by system administrators in different situations. For example, they can be used for backing up the user's configuration and resources as well as for problem analysis.

7.3.1 Access permissions in Advanced Server for UNIX

Advanced Server for UNIX stores access permissions for files and directories in its ACL database in the */var/opt/lanman* directory. In contrast to UNIX permissions, which are stored with each file and directory in the file system, permissions are stored centrally in Advanced Server for UNIX.

The ACL database stores access permissions for some resources, while other resources inherit their permissions from the higher-level directory. The *net perms* command displays permissions for all available resources, i.e. either permissions stored physically in the ACL database or those inherited from the higher-level directory. If a resource which is not yet entered in the ACL database is assigned permissions by *net perms*, the rights currently inherited are combined with those specified in the command and stored as a physical entry in the ACL database. If the physical entry is deleted, the inherited permissions are valid again.

If you are saving files with UNIX tools or copying files under UNIX, the permissions are not saved and copied automatically. Files and directories can be backed up together with their permissions using the NT Backup Tools, for example.

Another option here is to use the *accget* and *accadm* programs, which can be used in conjunction with UNIX mechanisms, for example for restoring access permissions following a system crash. Only the access permissions are saved and restored in this case, and not the actual files and directories. All that is required here is to back up the physical entries in the ACL database. For the restore procedure, the files and directories must be already created in the UNIX file system.

The definitions below should provide clarification of the terms used in the next section in conjunction with the *accget* and *accadm* tools:

Resource: UNIX directory or UNIX file

Resource_name: UNIX path name of a directory or file

Mountpoint: UNIX path name under which a UNIX file system is mounted

Permission record: Entry for a resource with its access permissions in the backup files

Backup file: Backup file name

7.3.2   Saving access permissions for resources (accget)

This tool is used to create a backup file called */var/opt/lanman/etc/accadm.dat* or */tmp/accget.dat* of the ACL database, which contains the following information (*permission records*):

● Shared resources (SHARES)

● Access permissions for resources

● Mountpoints for resources

The *accadm.dat* (or *accget.dat*) file is the input for the backup functions of the *accadm* command.

Syntax:

`accget [−?|help] [−n | −s] [−P <resource_name>]`

If the command is called without options, the */var/opt/lanman/etc/accadm.dat* file is created. The access permissions for all resources are stored in this file. Shared resources (SHARES) and mountpoints are saved at the same time. This command produces a complete backup of your access permissions on Advanced Server for UNIX.

`−n` The access permissions for all resources are stored with <user_name / group>.

   With option -n the access permissions are saved compatible to Advanced Server Version 3.5B00. The user/group names are stored as readable character strings according to *net perms* output. The server has to be started if this option is selected.

`−s` The access permissions for all resources are stored with <user / group SIDs> (default).

   The option -s saves access permission with the SIDs of the users / groups. SIDs are an internal description of the Security Identifiers of a user / group. It is not necessary to start the server if this option is used.

> **i** The default option of *accget* is *-s*.

`−P` The access permissions for the specified resource <resource_name> are stored in the */tmp/accget.dat* file. When you specify a directory, all directories and files under the specified directory are processed, including their access permissions. Shared resources (SHARES) and mountpoints are not stored again. If a blank file is created, this means that no entry could be found for the specified resource; if no file was created, an error has occurred. This command only creates a backup of the access permissions of a file or directory tree.

> **i** The */tmp/accget.dat* file created is overwritten each time the command is invoked and has to be backed up manually.

`−?|help` A description of the command is displayed.

Example:

```
accget −P /home
mv /tmp/accget.dat /home/backup/accget.dat
accget −P /var
mv /tmp/accget.dat /var/backup/accget.dat
```

> **i** If the command is called again, the existing backup files are overwritten. You should ensure that there is enough space available in the directories for the */tmp* or */var/opt/lanman/etc* backup files (at most the files require the same capacity as the */var/opt/lanman/datafiles/acl** database).

| i | Saving / restoring of an ACL database with SIDs makes sense only within the domain in which they have been created. After a new installation or after a change of the user/group configuration, the internal representation of the same name has a different SID. |

Saving / restoring beyond domains and beyond installations is possible by using option -n.

| ⚠ | Restoring an ACL database saved with SIDs of another domain or for users which have been deleted and created again in the meantime can destroy access permissions. |

Errors:

Error messages are written to the screen if errors occur; additional error messages may be written to the backup files to enable an internal investigation to take place.

7.3.3 Editing saved resources and access permissions (accadm)

The *accadm* tool is used to edit resources and their access permissions. The following options are available.

Syntax:

```
accadm   [-?|help] [-d <resource_name> | -r | -G | -E |
           -S [<backup file>] | -P | -Pg |
           -Fs [<mountpoint>] | -Fe <mountpoint> |
           -Fp <mountpoint> | -Fd <mountpoint> ]
```

-d   Deletes ('d'elete) the physical entry in the ACL database for the resource
        <resource_name>

-r   Removes ('r'emove) access permissions for resources that are no longer available
        from the ACL database by invoking *acladm -P*

-G   */var/opt/lanman/etc/accget* (acc'g'et) is invoked

-E   Enumerates ('e'numerate) the content of */var/opt/lanman/etc/accadm.dat* (standard
        function, if *accadm* is invoked without options)

-S   Shares are created with the content of <backup file> e.g. */tmp/accadm.dat.old.*
        If no <backup file> is specified, SHARES are created with the content of
        /var/opt/lanman/etc/accadm.dat.

-P The ACL database (net 'p'erm) is updated with the content of the */var/opt/lanman/etc/accadm.dat* file. New entries are added here, existing entries are updated, and unaffected entries are left as are. The files and directories must exit in a mounted filesystem. The resources must have been created beforehand.

-Pg The ACL database (net 'p'erm) is updated with the content of the */tmp/accget.dat* (acc'g'et.dat) file. New entries are added here, existing entries are updated, and unaffected entries are left as are. The files and directories must exit in a mounted filesystem. The resources must have been created beforehand.

-Fs A file ('F'ilesystem 's'cript) with the fixed name *asxperms* is created in the "<mount-point>" directory. The file contains "permission records", i.e. resource names with access permissions for resources which are created in the file system under the "<mountpoint>". The resource names are converted to path names relative to the mountpoint. If a mountpoint is not specified, this procedure is implemented for all mounted file systems, i.e. a file called *asxperms* is created under every mountpoint.

-Fe Displays the content of the <mountpoint>*/asxperms* file ('F'ilesystem script 'e'numerate).

-Fp The ACL database is updated with the content of the <mountpoint>*/asxperms* file. New entries are added here, existing entries are updated, and unaffected entries are left as are ('F'ilesystem script net 'p'erm). The files and directories must exit in a mounted filesystem. The resources must have been created beforehand.

-Fd Deletes the <mountpoint>*/asxperms* file ('F'ilesystem script 'd'elete).

-?|help A description of the command is displayed.

Example:

```
Mountpoints:        /var
                    /home

Resources:          /var/opt/lanman/shares
                    /home/user1/user1.dat
                    /home/user2/user2.dat
```

If you invoke `accadm -Fs`, the */var/asxperms* file contains an entry with the path name */opt/lanman/shares*, which contains the permissions saved for */var/opt/lanman/shares*.

The */home/asxperms* file contains entries with the path names */user1/user1.dat* and */user2/user2.dat*.

The data saved can be restored again under a different mountpoint on the basis of the relative position to the mountpoint.

> **i** The following directories are no valid mountpoints for *accadm*.
> */* (root directory), */proc*, */stand*, */dev/fd*
>
> Resources located in the root directory (i.e. which are not allocated to another mountpoint) are only saved in */asxperms* if *accadm -Fs* is invoked without specifying a mountpoint.

> **i** *accget* must have been executed before *accadm* is invoked.

accadm primarily supports separation of access permissions according to file systems so that they can be transferred to other file systems or UNIX systems (e.g. with OBSERVE). They are **not** a replacement for the regular backup of the ACL */var/opt/lanman/datafiles/acl** database. The following AS/X databases must also be available in a consistent form in order for a complete restore to be performed:

– */var/opt/lanman/datafiles/Builtin**
– */var/opt/lanman/datafiles/lsa**
– */var/opt/lanman/domains/*<domainname>*

These databases therefore always have to be backed up together.

7.3.4 Moving directories with existing access permissions

It may happen sometimes that a system administrator has to transfer the data from one file system to another file system (e.g. to a larger disk). Usually this task is carried out using UNIX commands. In doing so, the access permissions of the files and directories, which are stored in the Advanced Server for UNIX ACL database, are not adapted automatically. This task is performed by the *acladm* program ("-M" option). The Advanced Server for UNIX has to be stopped during this process.

Detailed information on the *acladm* command is available in the online manual page. Type *man acladm* at the Advanced Server command prompt.

The following example illustrates the shifting of the data from one directory */home1*, which is shared under the name *homedir*, to a directory */home2*.

1. Make sure that no client is linked to the shared directories on the file system. Stop sharing all directories on the corresponding file system, e.g. with
   net share homedir /delete
   You now stop the server using
   net stop server

2. Transfer the files and directories from one directory to the other using UNIX commands. Be careful to retain the directory structure and the owners, groups and permissions in UNIX. In our example, move the contents of */home1* to */home2*.

3. Call the command
   /var/opt/lanman/bin/acladm -M <from UNIX path> <to UNIX path>
   to change the access permissions in the Advanced Server for UNIX ACL database to
   the new path.
   Example:
   /var/opt/lanman/bin/acladm -M /home1 /home2

4. Start the server using the following command:
   net start server

5. Share the same directories on the new file system again with the same share name.
   Example:
   net share homedir=c:/home2

7.3.5   Saving the user configuration (userget)

This tool backs up the current user configuration and group configuration for the specified
system. The command can be invoked for the local system or for a remote server. The
/var/opt/lanman/etc/useradd.sh_local or */var/opt/lanman/etc/useradd.sh_<name of server>* file
created can be used for restoring a configuration.

> **i** To circumvent the restrictions noted below the file can be modified with the help of
> an editor!

Syntax:

`userget` [-?|help] [<servername> <domain> <administrator-password>]

> **i** The following restriction for User-options should be noted when restoring the
> configuration:
>
> /TIMES is always set to *ALL*.
>
> /HOMEDIRDRIVE is not applicable on Windows NT Servers.
>
> The password cannot be exported and is therefore set to *password* for all users and
> should then be changed subsequently.

7.3.6   Adding and removing server names (addserver/delserver)

You can use the *addserver* command to add an additional server name on a system, in order to enable the clients to access the server with the newly added name.

You can use the *delserver* command to delete a server name that was added with the *addserver* command. This disables the clients to establish a new connection to the server using this server name.

Usually these commands are used in high availability configurations.

Syntax:

```
addserver <computername>
delserver <computername>
```

Example:

One of two servers (*lion* and *tiger*) fails (e.g. *tiger*). The system administrator enters the following command on the *lion* system:

```
/var/opt/lanman/etc/addserver tiger
```

The connected clients have to re-establish the connection to the resources to be used. While the clients establish the connection under the name *tiger*, they use resources on the *lion* server.

After the failed server is operational again, the command for deleting the alternative name must be entered on the second server:

```
/var/opt/lanman/etc/delserver tiger
```

> **i** Existing connections to the server *lion* which were set up using the name *tiger* are not terminated when the name is deleted.

Advanced Server for UNIX can then be started on the failed server and the clients can use the resources on the *tiger* server again.

> **i** This example takes no note of any actions that may be necessary to ensure the availability of resources and user data.

7.3.7   Checking the password expiry with the asxpwexp utility

The *asxpwexp* utility can be used to check which Advanced Server for UNIX users'
passwords are due to expire within the next "n" (0-28) days. The user can be notified of this
by electronic mail, and be given plenty of advance warning if the utility is invoked regularly
using *cron*, for example.

Syntax:

```
asxpwexp [0-28] (default: 5)
```

In order to be able to send a mail, the *asxpwexp.usr* configuration file must be available and
provide a mapping between Advanced Server for UNIX users and a mail address for these
users. If there is no specific information to be provided to the user, a standard notification
is sent. The program uses the UNIX *mail* command internally.

Syntax of the asxpwexp.usr file:

```
<AS/X user>:<Mail_address>[:user-specific]
```

You can use any address that can also be used by UNIX Mail as the mail address.

Examples:

```
fred:fred: Your password will expire in 10 days!
steve:steveJ@lion
john:lion!johnny:Your password will expire now!
```

7.4   Compression of the ACL Database

Advanced Server for UNIX stores permissions for files and directories into it's ACL
database */var/opt/lanman/datafiles/acl**. Whereas UNIX permissions of files and directories
are part of the file system, AS/X permissions are stored in a central place.

If you rename (mv) or delete (rm, rmdir) these files or directories within UNIX the AS/X ist
bypassed and the entries in the ACL database will not be adapted. This results in entries
pointing to non-existing files and directories.

With the AS/X tool *acladm <option>* you can remove superfluous entries. However the
database will not be reorganized such that gaps exist between the used entries. The total
diskspace occupied will not be reduced. Those gaps will be used by future entries of course.

If you remove or delete files and directories from an AS/X client the ACL database will be
changed accordingly. Entries will be renamed or removed. However also in this case no
reorganization of the ACL database takes place.

⚠ The AS/X *acladm* utility with its different options removes entries identified as super-fluous in the configuration when the command is called. You must therefore make sure that the system configuration is complete (i.e. all file systems are mounted) and that the AS/X configuration is up to date. For example, if you change the AS/X MixedCaseSupport registry parameter to a different value than that at Advanced Server runtime, it may happen, for example, that *acladm -P* will delete too many ACL entries.

The following description shows how an the ACL database can be reorganized using several tools from Advanced Server for UNIX. During the reorganization process the server has to be stopped, therefore you should use a maintenance date for compression. Depending on the size of the database the compression may take some time.

► Check available disk space

In the file system where /var/opt/lanman is located the free space should be at least the size of the ACL database.

► Stop the server

net stop server

ⓘ All active connections with clients will be closed.

► Save the actual ACL database

e.g. *cp /var/opt/lanman/datafiles/acl* /save/datafiles*

ⓘ Take care that there is enough space in */save*.

► Clean old ACL database

Cleaning of the database takes place in two steps: In the first step you have to check the data for correctness and you have to repair them in case of need. Then you can remove all entries which are no longer necessary, e.g. entries of files and directories which are no longer existing in UNIX.

► Check the */var/opt/lanman/datafiles/acl* database:

/var/opt/lanman/bin/acladm -C -n

The -n option, when used with the -P or -C options, will give a complete list of all entries that need to be deleted or fixed. No changes are made to the ACL store.

► If necessary repair it:

► First option:

/var/opt/lanman/bin/acladm -C -y

The -C option will either fix or delete each corrupt entry. The -y option can be used together with the -C option to fix or delete ACL entries without user intervention. (-y is recommended if you expect a large number of modifications in the ACL database.)

► Second option:

/var/opt/lanman/bin/acladm -C -f

The -f option will only fix corrupt entries.
Entries that cannot be fixed (and would be deleted) are not deleted!

► Delete unused entries for non-existing files and directories:

/var/opt/lanman/bin/acladm -P -y

► To remove entries for non-existing users:

/var/opt/lanman/bin/acladm -U

► To remove redundant user entries:

/var/opt/lanman/bin/acladm -S

Please refer to the *acladm* manual page for the detailed usage of the *acladm* command. Type *man acladm* at the Advanced Server command prompt.

Internal database compression is performed directly by the low level database utility *blobadm*.

► To compress the ACL database:

/var/opt/lanman/bin/blobadm -q -A

> **i** The method of compressing the ACL database using the *accget* and *accadm* utilities is no longer recommended from Version 4.0A of Advanced Server for UNIX. Since the programs work on a higher level than the *blobadm* program, it may happen in certain configurations that the ACL database is not optimally compressed or even becomes larger in certain exceptional cases.

► In case of problems restore the old state the original database (e.g. /save/acl*) has to be copied to

/var/opt/lanman/datafiles

► Start the server.

net start server

7.5 OBSERVE support

In the context of providing functions for enabling high availability in systems, Advanced Server for UNIX contains some tools for supporting interaction with the OBSERVE product.

In this sense, "High Availability" means a configuration where two systems are operated in parallel so that the load can be distributed. If one of the two systems fails, the remaining system is available to users of both systems. This means that the affected disk areas and network controllers are switched about.

When the failed system is operational again, these switches are canceled again. The steps necessary to perform the switching are implemented using scripts. Sample scripts are supplied with OBSERVE and have to be adapted to suit the respective configuration.

A short description is given below of the steps to be performed in such a case:

1. Activate and deactivate network controllers:
   In the event of a system failing, a network interface is activated online and then deacti-vated again before the failed system is rebooted to enable the alternative system to be accessed using the same IP address as the failed system.
   The *nbconfig* tool is responsible for implementing this.

2. Activate and deactivate additional server names:
   In the event of a system failing, an additional server name is activated online and then deactivated again before the failed system is rebooted to enable the alternative system to be accessed using the same NetBIOS name as the failed system.
   The *addserver* and *delserver* tools are responsible for implementing this.

3. Transfer shares:
   Selected resources from a failed system must be made available on the alternative system since users on the failed system require access to their familiar resources after their system has failed. In order to minimize the effort involved, it is recommended that standard applications be made available on both servers using identical resource names.

4. Transfer access control lists:
   In order to ensure a smooth transfer of files from one server to another, the access permissions (ACLs) have to be transferred after the disk areas are switched and before the user accesses the active system. Since it is not possible to export the current permissions because the system is down, the last permissions saved are used. This means that access permissions are exported and saved regularly (for example once a night with *cron*). This also involves allocating access permissions to the "mountpoints" of the individual file systems which are handled separately using OBSERVE.
   Access permissions are transferred with the *accget* and *accadm* tools described above.

7.5.1   Constraints on high availability

The following conditions must be fulfilled in order to ensure the concept outlined here of high availability for systems:

– Both servers must be operated in one domain.

– If a system fails, a "reconnect" is necessary for the PCs connected (and possibly also a restart).

– The additional network interface available in each system does not supply data from the network under normal operating conditions.

– The switching of disk areas and the uniqueness of resource names is guaranteed.

– The administrator must be able to export all access permissions.

– In order to switch disk areas to the system that is now operational again, the alternative PCs must log off and then connect again after a successful switchover.

– Resources cannot be set up for a system while it is down.

– If the Primary Domain Controller (PDC) in a domain has failed, it will not be possible to modify users and groups for the duration of the down time.

– Access permissions for the failed system can only be updated to the status of the last "ACL backup".

– Only one of the servers is to provide "Print" shares.

– Configuration changes (e.g. additional shares) in emergency mode no longer exist once normal operation is resumed.

– If the WINS service is configured on one of the systems, it is not possible for the remaining system to take over the WINS service in the case of a failure.

   However, you can provide high avaliability of the WINS service - independently of OBSERVE - by configuring both systems as WINS servers and let these replicate with each other.

7.5.2   Example of how this works

Procedure when a system fails:

System A fails, System B continues to operate:

1. Activate additional B controller with the IP address of A.

2. Switch disks.

3. Provide resources (from A) on the active system (B). These resources must be identical.

4. Transfer access permissions for data from A (from the regular backup) to data on B.

5. Activate the interface of the additional A controller (on B).

6. Activate servername <A> on B.

7. Servername <A> is operational for the user with data from A.

Procedure when the failed system is operational again:

System A is operational again (system is idle, the switchover is canceled again by the administrator):

1. Delete existing connections by user of A on B.

2. Deactivate servername <A> (on B).

3. Deactivate interface of additional A controller on B.

4. Deactivate additional controller on B with the IP address of A.

5. Export and save access permissions for A data on B.

6. Delete shares (from A) on B if necessary (or leave the empty directory as is).

7. Switch disks again.

8. Remove unused entries from the ACL database (on B) if necessary.

9. Transfer access permissions for A data (on A) (from the backup on B).

10. Servername <A> is operational again for the user with the data from A.

The above example only shows the most important steps involved in this type of procedure. The OBSERVE scripts for high availability provide a more detailed description of the mutual system dependencies when a system fails.

Sample OBSERVE scripts are also supplied with the *OBSERVE* product. Should you require further information on operating OBSERVE, please contact you local support center.

8 Installing Network and Administrative Client Software

This chapter describes how to install the network and administrative software on client computers. It contains the following information:

- List of supported Microsoft network clients.

- Instructions on how to create installation diskettes and use the Network Client Administrator at a Windows NT computer.

- Instructions on how to install Windows NT Administrative Tools on a Windows NT Workstation computer.

- Instructions on how to install AS/U Administrator on Windows NT Workstation computer.

- Instructions on how to install Windows NT Server Tools on a Windows 95/98 client computer.

- Useful information about running Windows NT Server Tools on Windows 95/98.

- Instruction on how to install Windows NT Server Tools on a Windows 3.x client computer.

8.1 Network Clients

Advanced Server interoperates with the following Microsoft network client software:

- Windows 95/98

- Windows NT Workstation

- Windows for Workgroups, Version 3.11

- Network Client for MS-DOS, Version 3.0

- LAN Manager for MS-DOS Client, Version 2.2c

- LAN Manager for OS/2 Client, Version 2.2c

Advanced Server includes Microsoft Network Client and LAN Manager client software and documentation. Microsoft Windows 95/98, Windows NT Workstation, and Windows for Workgroups software and documentation are available from Microsoft.

8.1.1 **Microsoft Network Client Version 3.0 for MS-DOS**

Microsoft Network Client runs on computers running the MS-DOS operating system. Microsoft Network Client enables a computer to use resources on a network from either domains or workgroups, as well as resources on other networks (such as LAN Manager networks). A computer running Microsoft Network Client can use printers, programs, and data stored on an Advanced Server computer.

To issue Microsoft Network Client commands, use the pop-up interface or type commands at the MS-DOS command prompt.

The pop-up interface eliminates the need for remembering Microsoft Network Client commands at the MS-DOS command prompt. You can use it to view your current connections, browse for shared resources, and make new connections. It is a character-based utility; you must use the keyboard, not a mouse.

Experienced MS-DOS users familiar with Microsoft Network Client commands may prefer to enter commands at the MS-DOS command prompt rather than using the pop-up interface.

For more information on using Microsoft Network Client, see the *Windows NT Networking Guide* in the *Windows NT Server Resource Kit*.

8.2 **Creating Installation Diskettes**

Advanced Server includes the MSCLIENT share which provides disk images for the following Microsoft client software:

- Network Client for MS-DOS (requires 2 diskettes)

- LAN Manager for MS-DOS Client (requires 4 diskettes)

- TCP/IP for Windows for Workgroups 3.11 (requires 1 diskette)

- Update for Windows for Workgroups 3.11 (requires 1 diskette)

You can create installable client diskettes at the Advanced Server command prompt by using the Advanced Server **makeclients** command or connecting an MS-DOS client to the MSCLIENT share and using the MS-DOS **copydisk** command.

> **i** Before you can create installation diskettes, you must install the msclients package on the server computer as described in section "Installing the msclients package".

► To create client diskettes at the Advanced Server command prompt

1. Log on to Advanced Server console as "root".

2. Enter the following command located in the */var/opt/lanman/bin* directory:
   makeclients [-f] -d [drives | -D <devices>] <clientpkg>

where

-f	Disables formatting of the diskettes.
-d <drives>	This parameter is not supported.
-D <device>	Specifies the disk device. On Reliant UNIX-N the default is /dev/at/vfx3ht.
<clientpkg>	The name of the package for which you wish to create disks. Options are lanman, msclient, tcp32wfw and update.wfw.

The *makeclients* program will prompt you for each diskette in the set of client disks, format them in MS-DOS format, and populate them with the client software.

To create client installation diskettes from an MS-DOS client computer

► Log on at an MS-DOS client computer as an administrative user.

► Connect to the *MSCLIENT* share on the Advanced Server by typing the following command at the DOS prompt:

```
net use <d:> \\<servername>\msclient
```

Replace *<d:>* with the drive letter and *<servername>* with the name of the server.

► Change to the drive *<d:>* that connects to the *MSCLIENT* share.

► Change to the directory on the shared resource that contains the client package for which you want to make diskettes:

```
<d:> cd \images\<client directory>
```

Replace *<client-directory>* with one of the following:

```
lanman
msclient
tcp32wfw
update.wfw
```

► Copy the disk images in the directory to diskette using the *copydisk* command whose syntax is as follows:

```
d:\images\copydisk source [target]
```

- To create diskettes for LAN Manager for MS-DOS Client, type:
  ```
  d:\images\copydisk setup.dsk a:
  d:\images\copydisk drivers1.dsk a:
  d:\images\copydisk drivers2.dsk a:
  d:\images\copydisk netware.dsk a:
  ```

- To create diskettes for Microsoft Network Client, type:
  ```
  d:\images\copydisk disk1.dsk a:
  d:\images\copydisk disk2.dsk a:
  ```

- To create a diskette for TCP/IP-32 for Windows for Workgroups 3.11, type:
  ```
  d:\images\copydisk tcp32wfw.dsk a:
  ```

- To create a diskette for the Update for Windows for Workgroups 3.11, type:
  ```
  d:\images\copydisk update.dsk a:
  ```

8.2.1   Using Windows NT Network Client Administrator

Advanced Server supports the creation of network installation startup disks using Network Client Administrator from a Windows NT computer.

Use the Network Client Administrator to perform the following tasks:

► Create a network installation startup disk. With this single disk, you start a client computer, connect to a server that stores installation files, and install the full network software from that server.

► Create a network installation disk set. The disk set contains all the files needed to install network client software.

► Copy Client-based Network Administration Tools to any computer running Windows NT Workstation or Windows NT Server for which you have administrative permissions. Clients can then install the tools by connecting to the server.

Installing Network Client Administrator

The Network Client Administrator can be installed only on Windows NT Workstation computers.

▶   To install Network Client Administrator

1. From a Windows NT Workstation computer, log on to the Advanced Server domain.

2. Establish a connection to the MSCLIENT shared resource on Advanced Server.

3. In the *ncadmin* directory, click on directory that corresponds with the software that your computer is running. The system displays the Network Client Administrator program files.

4. Run the *setup.bat* program. The workstation-based network administrative tool is installed. You now can create an icon for it.

5. When installation is complete, terminate the connection to the MSCLIENT shared resource.

▶   To run Network Client Administrator

1. Click **Start** and then **Run …**

2. Type **ncadmin** in the **Run** dialog box and click **OK**.

8.2.1.1   Creating Network Installation Startup Disks

You can create network installation startup disks for the following network operating systems and clients:

● Windows 95/98

● Windows NT

● Windows for Workgroups, version 3.11

● Network Client for MS-DOS, version 3.0

By default, Network Client Administrator gives you the option to create network installation startup disks for Windows 95/98 and Microsoft Network Client for MS-DOS.

Before you can create network installation startup disks for Windows 95/98 or Windows for Workgroups, you first must create a folder on the installation server in the shared clients folder (*/var/opt/lanman/shares/msclient* by default) and then copy to it the appropriate source files. Windows 95/98 and Windows NT files can be copied from their CDs. Windows for Workgroups files can be copied from their diskettes.

Windows NT Workstation and Windows NT Server network installation startup disks can be created only for *x*86 computers and not for Alpha, MIPS, or Power PC computers.

> **i** You must purchase a valid software license prior to installing Windows 95/98 or
> Windows for Workgroups on a computer. However, you can install Microsoft
> Network Client for MS-DOS freely.

When creating network installation startup disks, you must choose from the network
interface cards (NICs) supported by Microsoft Network Client, version 3.0 for MS-DOS.
Regardless of the client software you are installing, the startup disk begins by starting
Microsoft Network Client so that it can connect to the server. The network card and its
settings are not automatically detected. You must select the correct NIC driver and
configure it appropriately.

For more information on using Network Client Administrator to create network installation
startup disks, see Network Client Administrator Help.

8.2.2 Creating Installation Disk Sets

You can create an installation disk set containing the actual installation files for the following
clients:

● Microsoft Network Client, version 3.0 for MS-DOS

● Microsoft LAN Manager, version 2.2c for MS-DOS

● Microsoft TCP/IP-32 for Windows for Workgroups, version 3.11

Using the installation disk set, you can install the software manually on each computer.
These files are included in the MSCLIENTS share. You can install this software on any
client computer freely.

For more information on using Network Client Administrator to create network installation
disk sets, see Network Client Administrator Help.

8.3 Administrative Clients

To administer Advanced Server from a Windows NT Workstation computer, you must install
Windows NT Administrative Tools. To administer Advanced Server from a Windows 95/98
client computer, you must install Windows NT Server Tools.

Both program groups are in the Administrative Tools Package (*asxtools or asxtoolsD*),
separately-installable software that is included with Advanced Server. It must be installed
on the server before you can install client-based administrative software according to the
instructions provided in this chapter. For information about installing the *asxtools* or *asxtoolsD*
package, see chapter "Installing Advanced Server for UNIX".

8.3.1   Installing Windows NT Administrative Tools

The Windows NT Administrative Tools program group provides administrative capabilities to the Windows NT Workstation computer. It can be installed *only* on Windows NT Workstation computers.

▶   To install Windows NT Administrative Tools

1.   From a Windows NT Workstation computer, log on to the Advanced Server domain.

2.   Establish a connection to the ASTOOLS or the ASTOOLSD shared resource on Advanced Server.

3.   In the *astools* or *astoolsd* directory, click on directory that corresponds with the software that your computer is running. The system displays the Windows NT Administrative Tools program files.

4.   Run the *setup.bat* program. The workstation-based network administrative tools are installed. You now can create icons for Server Manager, User Manager for Domains, Policy Editor, and WINS Administrator.

5.   When installation is complete, terminate the connection to the ASTOOLS or ASTOOLSD shared resource.

8.3.2   Installing AS/U Administrator (AS/X Administration Tool)

The AS/U Administrator enables you to modify the values of certain keys in the Advanced Server Registry. This tool can be installed on Windows NT Workstation computers, Versions 3.51 and 4.0.

▶   To install AS/U Administrator

1.   From a Windows NT Workstation computer, log on to the Advanced Server domain.

2.   Establish a connection to the ASTOOLS or ASTOOLSD shared resource on Advanced Server.

3.   In the *astools* or *astoolsd* directory, click on **asuadm**. The system displays the AS/U Administrator program files.

4.   Run the *setup.bat* program. AS/U Administrator is now installed. You can create an icon for the program in your Administrative Tools folder.

5.   When installation is complete, terminate the connection to the ASTOOLS or ASTOOLSD shared resource.

> **i**   The program **asuadm** is only available in english.

8.3.3   **Installing Windows NT Server Tools on Windows 95/98**

This section describes how to install Windows NT Server Tools on computers running Windows 95/98. It also discusses additional password prompts, trust relationships, logging on, and removing and using the program group.

▶   To install Windows NT Server Tools on a computer running Windows 95/98:

1. Make sure that your boot drive has at least 3.0 Mbytes of free disk space.

2. Using Explorer, establish a connection to the ASTOOLS or ASTOOLSD shared resource on the Advanced Server computer on which the package *asxtools* or *asxtoolsD* is installed. You can proceed as follows:

    a) On the Windows 95/98 computer, select **Tools** from the menu bar.

    b) Select **Map Network Drive** from the **Tools** menu.

    c) In the **Path:** box, enter the network path to the shared ressource *ASTOOLS* or *ASTOOLSD*, e. g. *\\server\astools*.

    d) Click on the **OK** button.

3. Click on **Start**, and then point to **Settings**.

4. Click on the **Control Panel**.

5. Double-click on **Add/Remove Programs**.

6. Select the **Windows Setup** tab.

7. Choose the **Have Disk** button. Specify the directory *\Win95* on the network drive (there must be a *srvtools.inf* file in this directory) that contains the Windows NT Server Tools. Choose **OK**.

8. Click on the box next to the Windows NT Server Tools entry.

9. Choose the **Install** button. After all of the files are copied, choose **OK**. Windows NT Server Tools are installed in a *\srvtools* folder on the computer's boot drive.

10. Manually adjust lines in the computer's AUTOEXEC.BAT file to include *c:\srvtools* in the PATH (if c: is the boot drive). For example, if the boot drive is c:, then append `;c:\srvtools` to the line that starts with "PATH ...", for example

    ```
    SET PATH=%PATH%;c:\srvtools
    ```

11. When the installation process is complete, disconnect the connection to the shared resource ASTOOLS or ASTOOLSD.

12. Restart the computer for the new path to take effect. (Click on **Start**, and then click on **Shut Down**. Select **Restart the Computer**. Click on **Yes**.)

The Windows NT Server Tools program group is now installed on the Windows 95/98 computer. The installation program has performed the following tasks:

- Copied the Windows NT Server Tools files to *c:\srvtools* (if c: is the boot drive).

- Added "Windows NT Server Tools" to the Start Programs menu.

- Added a "Windows NT Server Tools" program group to Program Manager (PROGMAN.EXE) which is compatible with Windows 3.*x*.

- Added extensions to Windows Explorer so that you can change security settings when viewing a resource or a print queue on a computer running Advanced Server, Windows NT Server, or Windows NT Workstation.

> **i** To use any of the programs in Windows NT Server Tools, you must have administrative privilege at the computer you choose to administer.

8.3.3.1 Additional Password Prompts

When you use Windows NT Server Tools on a Windows 95/98 client computer, you will be asked to log on or to enter your password for verification. These additional password prompts are necessary to ensure that you have administrative privilege for the server on which you are focused.

8.3.3.2 Trust Relationships

When you use the Windows NT Server Tools program group, you can create trust relationships between domains but you cannot verify them. Be sure to enter correct passwords for the trust relationships.

8.3.3.3 Logging on for Windows NT Server Tools

If you are not logged on and you start any of the programs in Windows NT Server Tools, you will receive a message that says that the computer is not logged on to the network. Remember to log on to the network before attempting to run any of the Windows NT Server Tools.

8.3.3.4 Using Event Viewer

Use the following procedure to use the Event Viewer in Windows NT Server tools on a computer running Windows 95/98.

► To use Event Viewer on a computer running Windows 95/98

1. Click on **Start**, point to Programs, and then point to Windows NT Server Tools.

2. Click on **Event Viewer**.

3. Type the name of a computer running Advanced Server, Windows NT Server, or Windows NT Workstation.

8.3.3.5 Using Server Manager

Use the following procedure to use the Server Manager in Windows NT Server tools on a computer running Windows 95/98.

► To use Server Manager on a computer running Windows 95/98

1. Click on **Start**, point to Programs, and then point to Windows NT Server Tools.

2. Click on **Server Manager**.

3. Select a computer to administer. Or, from the **Computer** menu, choose **Select Domain** to see computers in another domain.

8.3.3.6 Using User Manager for Domains

Use the following procedure to use the User Manager for Domains in Windows NT Server tools on a computer running Windows 95/98.

► To use User Manager for Domains on a computer running Windows 95/98

1. Click on **Start**, point to Programs, and then point to Windows NT Server Tools.

2. Click on **User Manager for Domains**.

3. Select a user account or group to administer. Or, from the **User** menu, choose **Select Domain** to see the accounts in another domain.

8.3.3.7 Editing Security Properties for Resources

Use the following procedure to edit the security properties for files, directories, and printers on Advanced Server.

► To edit security properties

1. Focus on the object and look at its Properties dialog box. There are several ways to perform this task, including the following:

   ► Click on **Start**, point at Programs, and then click on Windows Explorer. In the left pane, double-click on Network Neighborhood. In the right page, double-click on the name of the computer you want to administer. In the right pane again, click on the object that you want to administer. Click on the **Properties** button on the toolbar.

   ► Click on **Start**, point at Find, and then click on **Computer**. Type the name of the computer and then click on **Find Now**. Double-click on the name of the computer. Click on the object you want to administer. Click on the **Properties** button on the toolbar.

2. In the **Properties** dialog box, click on the Security tab. Now you can change the settings for permissions, auditing, and ownership of the object.

Note that there are several methods for selecting an object to administer that do *not* work in Windows 95/98, including the following:

● Administering print queues through the Printers list in My Computer. These print queue objects represent print queues local to your Windows 95/98 computer, even if the queue is redirected to an Advanced Server print queue.

● Using the Windows 3.*x* Print Manager. It no longer exists in Windows 95/98; the Printers icon in the Main group of Program Manager is simply a shortcut to the Printers list in My Computer.

● Using File Manager (WINFILE.EXE) in Program Manager. Installing Windows NT Server Tools does not add a Security menu to File Manager as it does for Windows 3.*x*.

8.3.3.8 Removing Windows NT Server Tools From Windows 95/98

Use the following procedure to remove Windows NT Server Tools from a computer running Windows 95/98.

► To remove Windows NT Server Tools from a Windows 95/98 computer

1. Click on **Start**, and then point to Settings.

2. Click on the **Control Panel**.

3. Double-click on **Add/Remove Programs**.

4. Select the **Install/Uninstall** tab.

5. If you have installed Windows NT Server Tools as described earlier in this section, then you should see the Windows NT Server Tools entry in the Uninstall list. Select it and click on **Add/Remove**.

The directory in which Windows NT Server Tools was installed (usually *c:\srvtools*) will not be removed by the Install/Uninstall program. You will have to remove this directory manually. You also will have to remove the path from the path variable in the AUTOEXEC.BAT file.

8.3.4 Considerations for Down-Level Windows Users

Advanced Server includes a down-level version of Windows NT Server Tools for Windows 3.*x* and Windows for Workgroups client computers. Although down-level Windows clients no longer are recommended as administrative clients, the Windows NT Server Tools program group offers down-level Windows client computers the following features:

● User Manager for Domains allows users to view user and group lists of accounts; it allows the creation of local groups to help manage access to files and directories.

● Event Viewer allows users to view system and application event logs on servers within the domain. (You can view the security log only if you are logged on as a member of the Administrators group.)

● When the Windows NT Server Tools program group is installed on a Windows workstation, the File Manager is modified to provide new options in the Security menu. These options provide the user with the capability to display and set file and directory permissions, and to view and take ownership of files on an Advanced Server. In this way, users gain the ability to manage permissions on their files and directories and to control access to them by others.

● Print Manager for Windows NT Server allows users to connect to shared printer queues on the Advanced Server.

⚠ Restrictions are described in the *readme.txt* file supplied.

8.3.4.1 **To install Windows NT Server Tools on a Windows client computer**

1. From the client workstation, log on to the Advanced Server.

2. Using File Manager, establish a connection to the *ASTOOLS* or *ASTOOLSD* shared resource on the Advanced Server, as follows:

   ► Select *Disk* from the menu bar.

   ► Select *Network Connections* from the Disk menu.

►   From the *Show Files Resources* pane in the *Drives-Network Connection* dialog box, select the server where *asxtools* was installed.

►   In the *Files Resources in <domain>* pane, select *ASTOOLS* or *ASTOOLSD*. The *ASTOOLS* or *ASTOOLSD* share contains the Windows NT Server Tools software. *ASTOOLS* or *ASTOOLSD* now is displayed in the *Path:* box with the next available drive letter.

►   Click on the *Connect* button.
      The connection is displayed in the *Network Driver Connections* box.

►   Click on the *Close* button.

3.   In the File Manager window, select the icon for the drive that you just created.

4.   In the *astools* or *astoolsd* directory, select *windows.* The system displays the Windows NT Server Tools program files.

5.   Scroll to the *setup.exe* program and follow this procedure.

►   Choose *Run* from the File menu to execute the *setup.exe* program or double-click on the *setup.exe* executable. (If you choose *Run*, the system displays a confirmation box. Click on *OK* to run the file.)

►   The system displays the *Windows NT Server Tools Setup Program* window on the client computer. Click on *Continue*.

►   Select the *Install all files* button. Windows NT Server Tools will be installed at the root drive in the *srvtools* directory. The *srvtools* directory is created for you.

►   Select the appropriate entry in the *Select Time Zone* dialog box.

►   When the *Windows NT Server Tools program* group has been installed, the system displays a message informing you to edit certain files. (This task is performed in Step 7.)

6.   When the installation process is complete, return to the File Manager and disconnect the connection to the shared resource *ASTOOLS* or *ASTOOLSD*, as follows:

►   Select *Network Connections* from the Disk menu.

►   In the *Network drive Connections* pane, select the connection to *ASTOOLS* or *ASTOOLSD* resource and click on the *Disconnect* button.

►   Click on the *Close* button.

7. During the installation of Windows NT Server Tools, the Setup program created the *new-conf.sys* and *new-vars.bat* files in the workstation's *srvtools* directory.

   Each of these files contains lines that you must copy to the client computer's *config.sys* and *autoexec.bat* files as follows:

   ▶ The *files* statement in the *\srvtools\new-config.sys* file is the recommended number of files. Edit the *config.sys* file to contain the following line:
   files=x

   where x is a number equal to or greater than the recommended number in the *new-conf.sys* file.

   ▶ Edit the *autoexec.bat* file to reflect the following changes:

   ● The directory containing the Windows NT Server Tools must be on the *PATH* line.

   ● If you are in a time zone other than Pacific Standard Time (PST), copy the time zone statement recommended in the *\srvtools\new-vars.bat* file. Add a *set tz* line to set the time zone.

   For example, if you are in Paderborn, you would add the following line:
   SET TZ=UCT-01:00DST

8. Reboot the client computer.

8.4 Getting Online Help

Most of the information that you need to learn about using network-based administrative clients now is provided in online Help. You can refer to online Help as your primary source of information on how to perform administrative procedures.

For information about how to navigate online Help, click on Help or consult your Windows NT Workstation or Windows 95/98 documentation.

9 Administering Advanced Server at the Command Prompt

This chapter describes how you can use Advanced Server commands and the Net command to administer Advanced Server at the UNIX system console. It contains the following information:

Advanced Server Commands — describes the UNIX system commands that you can use to administer Advanced Server at the command prompt. (All Advanced Server commands are installed in the *var/opt/lanman/bin* and *var/opt/lanman/etc* directory. The command **makeclients** is installed with the msclients package).

Net Command — lists the Net commands that are available to administer Advanced Server at the command prompt.

9.1 Advanced Server Commands

You can use UNIX system commands at the Advanced Server command prompt to perform several administrative tasks.

The following table lists the UNIX system commands that administrators can use with Advanced Server. Complete descriptions of each command can be found by typing the following at the Advanced Server command prompt:

```
man <name of command>
```

The description will list the purpose and syntax of the command and provide comments and examples.

Some commands, developed for special purposes, are described in chapter "Administration guidelines" and in chapter "Tools for special tasks".

Advanced Server Command	Description
accadm	Used to edit resources and their access permissions.
accget	Used to create a backup file of the ACL database.
acladm	Creates, checks, modifies, prunes, and removes the Access Control List (ACL) database.
addclipr	Used to add an Advanced Server client printer device to the configured spooler.
addserver	Used to add a server name on a system, in order to enable the clients to access the server with the newly added name.
asxcheck	Shows information about the installation of Advanced Server, may be helpful to locate problems with in your configuration.
asxinfo	Used to provide information on the Advanced Server configuration in the event that errors occur.
asxperf	Used to get a "rough" overview of the CPU-time consumption of Advanced Server and other processes.
asxpwexp	Used to check which Advanced Server users' passwords are due to expire and to notify users by electronic mail.
asxregview	Comfortable display and search utility for the contents of the Advanced Server Registry database at the UNIX command prompt.
blobadm	Displays statistical information, checks, and configures well-known or specified BLOB files.
delclipr	Used to delete an Advanced Server client printer device from the configured Spooler.
delserver	Deletes a server name that was added with the "addserver" command.
delshmem	Deletes Advanced Server shared memory.
elfread	Used to view event logs on the local Advanced Server computer at the UNIX system console.
euctosjis	Converts the coding of characters from Extended UNIX Code (EUC) to Shift-JIS (S-JIS) encoding.
joindomain	Used to move an Advanced Server from one domain to another.

Advanced Server Command	Description
lmat	Schedules commands or programs to run on a server at a specified time or date. (Note there also exists UNIX system and MS-DOS **at** commands.)
lmshare	Manipulates the Advanced Server share list without server intervention.
lmshell	Provides the "look and feel" of an MS-DOS shell at the Advanced Server command prompt. Allows users to log on and link to other servers on the network, and to run a subset of DOS commands.
lmstat	Displays statistical information retrieved from the Advanced Server's shared memory.
makeclients	Used to produce installation diskettes for Microsoft Network Client software.
mapuname	Lists, maps and unmaps Advanced Server user, global group, and local group names to and from UNIX system user names.
netevent	Used to send administrative or user alerts, or to send printing alerts to users submitting print jobs.
printadm	Used to check, display, modify, export and import the printer driver configuration on Advanced Server systems.
promote	Changes the role of an Advanced Server domain controller to be either a primary domain controller or a backup domain controller.
regcheck	Manipulates the Advanced Server Registry to enumerate Registry keys, dump the contents of the Registry, or to check and repair Registry files.
regconfig	Used to query or set Advanced Server Registry key information.
regload	Used to create a registry file if one does not exist. Also used to reinitialize registry to system defaults.
repladm	Configures the replicator service.
samcheck	Used to check or fix the SAM database, or to dump the change log, built-in, account, or LSA databases.
setdomainlang	Changes the language of predefined objects within domain.

Advanced Server Command	Description
setdomainname	Used to change the domain name of the local Advanced Server.
setlang	Changes the output language of net commands, elfread and the Event-Viewer.
setservername	Used to change the name of the local Advanced Server.
setspooler	Configures the UNIX system spooler for the Advanced Server.
sjistoeuc	Converts the coding of characters from Shift-JIS (S-JIS) to Extended UNIX Code (EUC) encoding.
srvconfig	Used to display or modify Advanced Server configuration information stored in the *lanman.ini* file.
srvstat	Generates an activity monitor that displays statistics which summarize total server usage as well as file and print service requests made by individual users.
ud	Converts text files between MS-DOS, UNIX system, and Macintosh file formats.
userget	Backs up the current user configuration and group configuration for the specified system.
userrights	Used to manage user rights on an Advanced Server.
winsadm	Configures the Windows Internet Name Service (WINS).

9.2   Net Command

Many Advanced Server administrative tasks can be performed using the Net command at the Advanced Server command prompt. Although we recommend that you use the programs available through Windows NT Administrative Tools and Windows NT Server Tools to administer Advanced Server, the Net command-line interface also can be used.

The following sections summarize the Net commands that are available in Advanced Server and describes syntax and usage conventions.

9.2.1   Administering Local and Remote Servers

When you administer a server while you are working at the server command prompt, that server is called the *local* server. If you are administering a server from the command prompt of another server, the server being administered is called the *remote* server.

Some of your network users may be designated as *account operators*, *print operators*, or *server operators*. These users have limited administrative or operator privileges that enable them to perform specific tasks. These privileges are sufficient to use the Net command to administer a local server at the Advanced Server command prompt.

However, to use the Net command to administer a remote Advanced Server, you must be logged on to Advanced Server as an Administrator with full administrative privilege. If you have different operators responsible for parts of your network and you do not want to assign them full administrative privilege, then they must work only at the Advanced Server command prompt of the server being administered.

9.2.1.1   Administering a Local Advanced Server

▶   To administer a local Advanced Server using the Net command

1. Log on to the UNIX system hosting the Advanced Server.

2. At the UNIX system prompt, log on to the network as Administrator or as a user with administrative privileges by typing the following command:

   `net logon` *username password*

3. Enter the appropriate Net command. For example, to display a list of the server's shared resources, type

   `net share`

i	Remember to log off using the command *net logoff* when you have finished administering Advanced Server, since log off will not be carried out automatically when you exit the UNIX shell.

9.2.1.2 Administering a Remote Advanced Server

To perform server administration tasks using the Net command remotely, use the **net admin** command and the appropriate Net command for the task. Step 2 of the following procedure describes two ways of entering the **net admin** command.

▶ To enter a Net command remotely

1. Log on to the network as Administrator or as a user with administrative privileges. (Operator privileges are not sufficient to perform this procedure.)

2. Enter the **net admin** command using one of the following methods:

   Enter a separate **net admin** command for each Net command you wish to execute. For example, to display statistics for a server named *account*, type the following:

   ```
   net admin \\account /command net statistics server
   ```

   This method is useful for batch files.

   Enter a **net admin** command followed by multiple **net** commands. For example, to execute multiple **net** commands on a server named *payroll*, type the following:

   ```
   net admin \\payroll /command
   ```

   This creates an *administrative command shell* from which you subsequently can issue Net commands. The prompt changes to include the name of the server you are remotely administering, for example, *\\payroll.*

   Any Net command that you type at this prompt executes on the server that you specify. For example, at the prompt, type:

   ```
   [\\payroll] net share
   ```

   ```
   [\\payroll] net print
   ```

   where *\\payroll* is the prompt, and **net share** and **net print** are the commands.

   To exit the command shell and return to the system prompt, type **exit** or press CTRL+Z.

> **i** Net commands which take a domain or computer name as an option can be used for administering remote servers. This type of administration can be performed directly at the UNIX system command prompt without using the *net admin* command. For example, to display local groups on a remote domain named *market_dom*, you would type *net localgroup /domain:market_dom*.

9.2.1.3   Paging Through Screens

Some displays provide more than one screen full of information. For example, the following command provides several screens of information on the **net share** command:

```
net help share /options
```

To display information one screen at a time, use the **more** command, for example:

```
net help share /options | more
```

After you have examined one screen of information and are ready to proceed, press the SPACEBAR to display the next screen of text.

9.2.1.4   Using Passwords With Commands

Some commands require a password as an option. You can provide a password as a command option by typing the password on the same line as the command itself. For example, to log the user name *jim* with the password *kahuna* on the network, you would type:

```
net logon jim kahuna
```

You can also ask the Advanced Server to prompt you for your password, replacing the password with an asterisk (*) when you type the command.

> **i**   In the UNIX operating system, the asterisk (*) is a special character and must be preceded by a back slash (\ ).

For example, to use the same resource described above, type:

```
net logon jim \*
```

The Advanced Server then displays the following message:

```
   Type your password:
```

When you enter a password at this prompt, the password does not appear on the screen as you type. This allows you to keep your password confidential, providing added security.

If you forget to type a password with a command that requires one, the Advanced Server prompts you for it. Depending on the command that you type, the Advanced Server also may prompt you for other pertinent information such as your user name.

9.2.1.5   Using Command Confirmation

Some Net commands require confirmation. The **/yes** and **/no** options help expedite Net commands. When Advanced Server reads one of these options, it does not pause to display the corresponding prompt. Instead, Advanced Server accepts the **/yes** or **/no** option as your response to the prompt.

You can use Net commands with **/yes** (**/y**) and **/no** (**/n**) options to create batch files and shell scripts that are not interrupted by Advanced Server prompts.

For example, if you use the **net logoff** command to log off the local area network with connections to remote shared resources intact, Advanced Server displays a prompt similar to the following:

```
You have the following remote connections:

LPT1

Continuing will cancel the connections.

Do you want to continue this operation? (Y/N)  [Y]:
```

You can use the **/yes** and **/no** options with any Net command to anticipate and respond to a prompt. For example, you are not prompted for confirmation when you type the following:

```
net logoff /yes
```

9.2.1.6   Using Abbreviations

The command reference pages in this chapter always use the full command names, command options, and service names. However, Advanced Server recognizes abbreviations.

You can abbreviate any command option by typing enough letters to distinguish it from other command options. For example, the following is the syntax for the **net accounts** command:

```
net accounts [/forcelogoff:{minutes|no }]
[/minpwlen:length]
[/maxpwage:{days|unlimited}][/minpwage:days] [/uniquepw:number]
```

You can abbreviate the options as illustrated in the following example:

```
net accounts /f:10 /minpwl:6 /ma:unlimited /minpwa:7 /u:3
```

You cannot abbreviate option values (for example, the unlimited option for */maxpwage*).

9.2.1.7 Using Special Characters With Commands

Some of the names or passwords that you need to enter may contain one or more special characters, for example, an ampersand (&). When you are at the UNIX system command prompt typing a name with a special character in an Advanced Server command, you must use an escape character (the back slash [****]) before each special character. If you are at a client computer, you can surround the string containing the special characters in double quotes.

For example, to log on with the user name *marksp* and the password *mrkt&dev* on the UNIX system command prompt, you could type the following:

```
net logon marksp mrkt\&dev
```

Some commonly used UNIX system special characters include the following: asterisk (*); semi-colon (;); pipe (|); square brackets ([ ]); parentheses [( )]; question mark (?); ampersand (&); caret (^); back slash (\ ); greater-than and less-than signs (< >); blank ( ) and the "at" sign (@).

There are other UNIX special characters that you may encounter. For more information on special characters, consult your UNIX system documentation.

9.2.1.8 Typing Path Names With UNIX System Net Commands

The UNIX system uses a forward slash to separate names in a path. This is different from client computers, which use back slashes. Always precede path names with c: when using the Net command.

When typing path names at a UNIX system command prompt, you can use any of the following methods:

- **Single forward slashes** — separate each element of the path with single forward slashes, like this:

```
net share tmpshare=c:/tmp /us:10 /r:"Share for temporary use"
```

- **Double back slashes** — separate each element of the path with double back slashes, like this:

```
net share tmpshare=c:\\tmp /us:10 /r:"Share for temporary use"
```

- **Single quotes** — separate each element of the path with single back slashes and surround the whole path in single quotes, like this:

```
net share 'tmpshare=c:\tmp'/r:"Share for temporary use"
```

- **Double Quotes** - When including spaces in values, you need to enclose the value in double quotes. For example, to change the comment for the *domain guests* group, you could type the following command:

```
net group "domain guests" /comment:"All domain guests"
```

9.2.1.9   Typing Path Names at Client Computers

Client computer operating systems, such as Windows 95/98, Windows NT, MS-DOS, and OS/2 use back slashes to separate names in paths. For example:

```
net use f: \\product\data
```

9.2.2   Understanding Command Syntax

The commands that are used in Advanced Server will be easier to understand and use if you keep the following concepts in mind:

- When an option is enclosed in braces ({ }), the option is a required item in the syntax statement. For example, {yes | no} indicates that you must specify yes or no when using the command.

- When an option is enclosed in brackets ([ ]), it is an optional item in the syntax statement. For example, [*password*] indicates that a password may be used with the command, if desired.

- When a vertical bar (|) separates items within braces or brackets, only one of the options must be used. For example, {**/hold | /release | /delete**} indicates that only one of the three options must be used.

- When an ellipsis (…) appears in a syntax statement, it indicates that you can repeat the previous item(s). For example, **/route:** *devicename* [**, ...**] indicates that you can specify more than one device, putting a comma between the device names.

- Be sure to type slashes (/), back slashes (\ ), commas (,), double quotes (" "), equal signs (=), colons (:), semicolons (;), and asterisks (*) as they are shown.

- Replace the pound sign (**#**) with a number.

- At the UNIX system command prompt, you must type Net commands in lower-case letters.

- When you finish typing a command, press ENTER. If you are typing a long command string, do not press ENTER when your cursor gets to the edge of your screen; the cursor will "wrap around" and continue on the next line of your screen. Press ENTER only after you finish typing the entire command string.

9.2.3 Getting Help on Net Commands

On-line help is available for all of the Net commands that you can enter at the server command prompt. It provides command parameters, syntax, details about a command, and examples of the command in use.

To obtain information about a Net command, type one of the following commands at the Advanced Server system prompt:

Command	Descriptions
net help	Names of available Net commands.
net help *command*	Description, syntax and options for Net commands.
net *command* **/help**	Description, syntax and options for Net commands.
net *command* **/?**	Syntax only for Net commands.
net help *command* **/options**	Detailed description of the options of the command you selected.

9.2.3.1 Advanced Server Net Commands

The Advanced Server Net commands described in the following table are supported at the Advanced Server command prompt.

Command	Descriptions
net access	Displays or modifies resource permissions on servers. Use this command only for displaying and modifying permissions on pipes and printer queues. Use **net perms** for managing permissions on all other types of resources.
net accounts	Displays the role of servers in a domain and displays or modifies password and logon user requirements.
net admin	Runs an Advanced Server command or starts a command processor on a remote server.
net auditing	Displays and modifies the auditing settings of a resource.
net browser	Displays the list of domains that are visible from a local server or the list of computers that are active in a domain.
net computer	Displays or modifies the list of computer accounts in a domain. This command also can be entered as **net computers**.
net config	Displays the controllable services that are running. This command can also be used to display or change settings for controllable services.

Command	Descriptions
net continue	Reactivates suspended services when typed at a server, and reactivates paused shared printers when typed at a client computer.
net device	Displays list of device names and controls printers. When used without options, this command displays the status of all printers at the specified server. When used with the printer name option, this command displays only the status of the specified printer.
net file	Displays the names of all files opened via the Advanced Server and the number of file locks, if any, on each file. This command also can be used to close files. When used without options, this command lists all of the open files at a server. This command also can be typed as **net files**.
net group	Adds, displays, or modifies global groups.This command also can be typed as **net groups**.
net help	Provides lists of network commands and topics for which you can get help, or provides help for a specific command or topic.
net helpmsg	Provides help for a network error message.
net localgroup	Adds, displays, or modifies local groups in domains.This command also can be typed as **net localgroups**.
net logoff	Logs a user name off of the network.
net logon	Logs a user name on to the server and sets the user name and password for the user's client. If you do not specify a user name with this command, the default user name will be your UNIX system logon name.
net password	Changes the password for a user account on a server or in a domain.
net pause	Suspends services or printers at a server.
net perms	Displays or modifies resource permissions and ownership information on servers. The resources on which this command currently operates are shares, directories, and files.
net print	Displays or controls print jobs and printer queues; also sets or modifies options for a printer queue.
net send	Sends message to connected client computers.

Command	Descriptions
net session	Lists or disconnects sessions between a server and clients. When used without options, this command displays information about all of the sessions with the local server. This command also can be typed as **net sessions**.
net share	Creates, deletes, modifies, or displays shared resources. Use this command to make a resource available to clients. When used without options, this command displays information about all of the resources being shared on the server.
net sid	Performs translations between account names and their corresponding security identifiers (SIDs).
net start	Starts a service or, if used without options, displays a list of services that are running. The services that can be started are Alerter, Computer Browser, Directory Replicator, EventLog, Net Logon, Netrun, NvAlert, Server, Time Source, and WINS.
net statistics	Displays or clears the statistics log.
net status	Displays a server's computer name, configuration settings, and a list of shared resources.
net stop	Stops a network service.
net time	Synchronizes the client's clock with that of a server or domain, or displays the time for a server or domain.
net trust	Establishes and breaks trust relationships between domains, and lists trust information for a specified domain.
net user	Adds, modifies, or deletes user accounts or displays user account information.
net version	Displays version of network software currently running on the computer at which the command is issued.
net view	Displays list of servers or displays resources being shared by a server

10 Implementing WINS

Windows Internet Name Service (WINS) for Advanced Server provides a Windows NT compatible, replicated, dynamic database for registering and querying NetBIOS computer name-to-IP address mappings in a routed network environment. Advanced Server WINS is designed to solve the problems that occur with name resolution in complex internetworks.

Advanced Server WINS reduces the use of local broadcast messages for name resolution and allows users to locate systems easily on remote networks. And, when dynamic addressing through DHCP results in new IP addresses for computers that move between subnets, the changes are updated automatically in the WINS database. Neither the user nor the administrator needs to make changes manually.

The WINS protocol is based on and is compatible with the protocols defined for NBNS in RFCs 1001 and 1002. It therefore is interoperable with other implementations of these RFCs. WINS for Advanced Server is fully compatible with Microsoft WINS client implementations including Microsoft TCP/IP-32 for Windows for Workgroups 3.11, Windows 95/98, Windows NT Workstation, Windows NT Server, and the Microsoft Network Client, Version 3.0, and with the WINS client integrated in the Advanced Server for UNIX NetBIOS.

Advanced Server WINS is fully interoperable with WINS for Windows NT Server. It can replicate name databases with other Advanced Server WINS computers, and with WINS for Windows NT systems.

Advanced Server WINS is managed by the same Windows NT-based tool that is used to manage WINS for Windows NT. This allows both Advanced Server-based and Windows NT-based WINS servers to be managed from a single administrative tool on a single computer in the network.

This chapter describes how to configure and administer WINS on a computer running Advanced Server.

10.1   Name Resolution Services

Advanced Server WINS with TCP/IP requires a unique IP address and computer name for each computer on the network. Although programs use IP addresses to connect computers, administrators use "friendly" names to connect them. As a result, TCP/IP inter-networks require a *name resolution service* that converts computer names to IP addresses and IP addresses to computer names.

An IP address is the unique address by which all other TCP/IP devices on the internetwork recognize that computer. For TCP/IP and the Internet, the *computer name* is the globally known system name, plus a *Domain Name System* (DNS) domain name.

DNS computer names consist of two parts: a host name and a domain name, which combined form the fully qualified domain name (FQDN).

In contrast, Advanced Server networking components rely on a naming convention known as NetBIOS. In general, NetBIOS computer names consist of a single part. Although NetBIOS names are compatible with DNS host names, both naming conventions should be well distinguished.

On the local network, the computer name is the name that was supplied either during Advanced Server or Windows NT setup. To ensure that both names and IP addresses are unique, a computer using NetBIOS over TCP/IP registers its name and IP address on the network during system startup.

A computer can use one or more of the following methods to ensure accurate NetBIOS name resolution in TCP/IP internetworks:

● Windows Internet Name Service (WINS)

   A computer can use WINS if at least one WINS server is available that contains a dynamic database that maps computer names to IP addresses. WINS can be used in conjunction with broadcast name resolution for an internetwork where other name resolution methods are inadequate. As described in the following section, WINS is a NetBIOS over TCP/IP mode of operation defined in RFC 1001/1002 as p-node.

● Broadcast name resolution

   A computer also can use broadcast name resolution, which is a NetBIOS over TCP/IP mode of operation defined in RFC 1001/1002 as b-node. This method relies on a computer making IP-level broadcasts to register its name by announcing it on the network. Each computer in the broadcast area is responsible for challenging attempts to register a duplicate name and for responding to name queries for its registered name.

● DNS name resolution

The Domain Name System (DNS) provides a way to look up name mappings when connecting a computer to foreign hosts using NetBIOS over TCP/IP or applications such as FTP.

| **i** | Advanced Server does not use this method.

● An LMHOSTS/*names.cfg* file to specify the NetBIOS computer name and IP address mappings, or a HOSTS file to specify the DNS name and IP address.

On a computer running Microsoft networking components, the HOSTS file (used by Windows Sockets applications to find TCP/IP host names) and LMHOSTS file (used by NetBIOS over TCP/IP to find Microsoft networking computer names) can be used to list known IP addresses mapped with corresponding computer names. LMHOSTS is used for name resolution for small-scale networks or remote subnets where WINS is not available. For more information about the LMHOSTS file, see Windows NT Help and the *Microsoft Windows NT Resource Kit Networking Guide*.

On a computer running Advanced Server, a *names.cfg* file can be used in a way comparable to the LMHOSTS file, see section "The names.cfg file".

| **i** | Advanced Server networking components never use HOSTS files for name resolution.

10.1.1   NetBIOS over TCP/IP (NetBT) Name Resolution

NetBIOS over TCP/IP (NetBT) is the session-layer network service that performs name-to-IP address mapping for name resolution. In Advanced Server, NetBT name resolution is implemented through WINS, broadcast name resolution and the optional use of a *names.cfg* file containing static name-to-IP-address mappings.

The two most important aspects of the related naming activities are *registration* and *resolution*:

● Registration is the process used to register a unique name for each computer (node) on the network. A computer typically registers itself when it starts.

● Resolution is the process used to determine the specific address for a computer name.

| **i** | RFCs 1001 and 1002 specify how NetBIOS should be implemented over TCP/IP and define the name resolution modes.

Defined within NetBT are modes which specify how network resources are identified and accessed. The most common NetBT modes are as follows:

● *b-node*, which uses broadcast messages to resolve names.

● *p-node*, which uses point-to-point communications with a name server to resolve names.

● *m-node*, which first uses b-node and then—if necessary—p-node to resolve names.

● *h-node*, which first uses p-node for name queries and then b-node if the name service is unavailable or if the name is not registered in the database.

| i | The RFCs refer to a NetBIOS Name Server (NBNS). WINS is an enhanced NBNS. |

The two most common node types for Windows client computers are h-node and b-node.

For DHCP users, the node type is assigned by the DHCP server. When WINS servers are in place on the network, NetBT resolves names on a client computer by communicating with the WINS server. When WINS servers are not in place, NetBT uses b-node broadcast messages to resolve names. NetBT also can use LMHOSTS files for name resolution, depending on how TCP/IP is configured on a particular computer.

Advanced Server can respond to b-node and h-node NetBT modes. (Windows NT supports all of the NetBT modes.) Client computers can use the modes described in the following sections.

B-Node (Broadcast Node)

The b-node mode uses broadcasts for name registration and resolution. That is, if CLIENT_PC1 wants to communicate with CLIENT_PC2, it will broadcast to all machines that it is looking for CLIENT_PC2 and then will wait a specified time for CLIENT_PC2 to respond.

The b-node mode has two major problems:

● In a large environment, it loads the network with broadcasts.

● Typically, routers do not forward broadcasts, so computers that are on opposite sides of a router will never hear the requests.

P-Node (Point-to-Point Node)

The p-node mode addresses the issues that b-node does not solve. In a p-node environment, computers neither create nor respond to broadcasts. All computers register themselves with the WINS server, which is responsible for knowing computer names and addresses and for ensuring no duplicate names exist on the network.

In this environment, when CLIENT_PC1 wants to communicate with CLIENT_PC2, it queries the WINS server for the address of CLIENT_PC2. Upon receipt of the address, it goes directly to CLIENT_PC2 without broadcasting. Because the name queries go directly to the WINS server, p-node avoids loading the network with broadcasts. Because broadcasts are not used and because the address is received directly, computers can span routers.

The most significant problem with the p-node mode is the following:

● If the WINS server is down, computers that rely on the WINS server to resolve addresses cannot get to any other systems on the network.

● All computers must be configured to know the address of the WINS server.

M-Node (Multi-Node)

The m-node mode was created primarily to solve the problems associated with b-node and p-node. In an m-node environment, a computer first attempts registration and resolution using b-node. If that fails, it switches to p-node.

The advantages of the m-node mode are the following:

● The m-node can cross routers.

● Because the b-node always is tried first, computers on the same side of a router continue to operate as usual if the WINS server is down.

● In theory, it should increase local area network (LAN) performance.

H-Node (Hybrid Node)

The h-node mode solves the most significant problems associated with broadcast messages and with routed-environment operations. It is a combination of b-node and p-node that uses broadcast messages as a last effort. The h-node mode does more than change the order for using b-node and p-node. If the WINS server is down — making broadcast messages a necessity — the computer continues to poll the WINS server. When the WINS server can be reached again, the system returns to p-node.

Because p-node is used first, no broadcast messages are generated if the WINS server is running, and computers can be on opposite sides of routers. If the WINS server is down, b-node is used allowing computers on the same side of a router to continue to operate as usual.

| i | For Microsoft TCP/IP users who configure TCP/IP manually, h-node is used by default unless the user does not specify addresses for WINS servers when configuring TCP/IP. |

Other Combinations

Another variation, known as *Microsoft modified b-node*, is used in Advanced Server networks to allow messages to go across routers. The modified b-node does not use p-node mode or a WINS server. In this mode, b-node uses a list of computers and addresses stored in an LMHOSTS file. If a b-node attempt fails, the system looks in LMHOSTS to find a name and then uses the associated address to cross the router. On computers running Advanced Server, this variation corresponds to the *Siemens modified b-node* where the mappings from a *names.cfg* file are used before or after the b-node attempt (section "The names.cfg file"). However, each computer must have these files which creates an administrative burden in maintaining and distributing the files.

Both Windows for Workgroups 3.11 and LAN Manager 2.x use a modified b-node system. Windows NT as well as Advanced Server uses this method if WINS servers are not used on the network. In Windows NT, some extensions have been added to the LMHOSTS file to make it easier to manage but modified b-node is not an ideal solution.

Some sites may need to use both b-node and p-node modes at the same site. Although this configuration can work, administrators must exercise caution, using it only for transition situations. Because p-node hosts disregard broadcasts and b-node hosts rely on broadcasts for name resolution, the two hosts potentially can be configured with the same NetBIOS name, leading to unpredictable results. Notice that if a computer configured to use b-node has a static mapping in the WINS database, a computer configured to use p-node cannot use the same computer name.

10.1.2   **WINS and Broadcast Name Resolution**

WINS provides a distributed database for registering and querying dynamic computer name-to-IP address mappings in a routed network environment. WINS is designed to solve the problems that occur with name resolution in complex internetworks.

WINS reduces the use of local broadcasts for name resolution and allows users to locate systems easily on remote networks. Additionally, when dynamic addressing through DHCP results in new IP addresses for computers that move between subnets, the changes are updated automatically in the WINS database. Neither the user nor the network administrator needs to make changes manually.

The following sections provides an overview of how name resolution is provided by WINS and name query broadcast messages.

10.1.2.1   **WINS in a Routed Environment**

WINS consists of the following two components:

- The WINS server, which handles name queries and registrations.

- Client software, which registers computer names and queries for computer name resolution.

  Computers running

  - Window NT

  - Windows 95/98

  - Windows for Workgroups 3.11 (with Microsoft TCP/IP-32)

  - LAN Manager for DOS 2.2c

  - Siemens Advanced Server for UNIX V3.51 (V3.5B10)

  - Siemens Advanced Server for UNIX V4.0

  can use WINS directly.

Non-WINS computers on the internetwork that are b-node compatible (as described in RFCs 1001 and 1002) can access WINS through proxies (WINS-enabled computers that listen to name-query broadcasts and then respond for names that are not on the local subnet or are p-node computers).

To allow browsing across routers without WINS, the network administrator must ensure that the users' primary domain has Advanced Server, Windows NT Server, or Windows NT Workstation computers on both sides of the router to act as master browsers. These computers need correctly configured LMHOSTS */names.cfg* files with entries for the domain controllers across the subnet.

With WINS, such strategies are not necessary because the WINS servers and proxies transparently provide the support necessary for browsing across routers where domains span the routers.

The following illustration shows a small internetwork, with three local area networks connected by a router. Two of the subnets include WINS name servers, which can be used by clients on both subnets. WINS-enabled computers, including proxies, access the WINS server directly, and the computers using broadcasts access the WINS server through proxies. Proxies intercept the broadcast messages and send them directly to the WINS server.
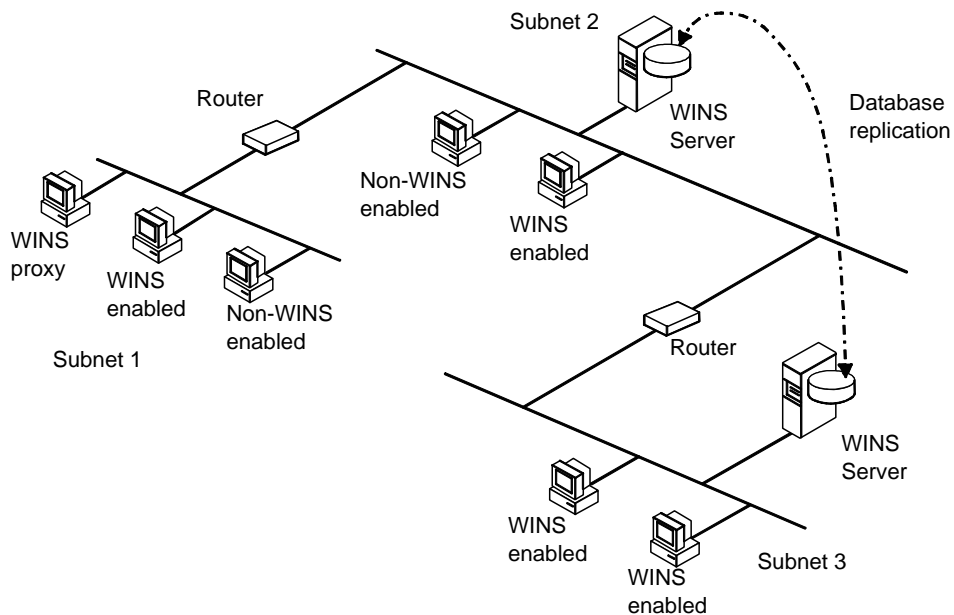
Example of an Internetwork with WINS Servers

The proxy communicates with the WINS server to resolve names and then caches the names for a certain time. The proxy serves as an intermediary either by communicating with the WINS server or supplying a name-to-IP address mapping from its cache.

The illustration above shows the relationships among WINS servers and clients, including proxies for non-WINS computers and replication between WINS servers.
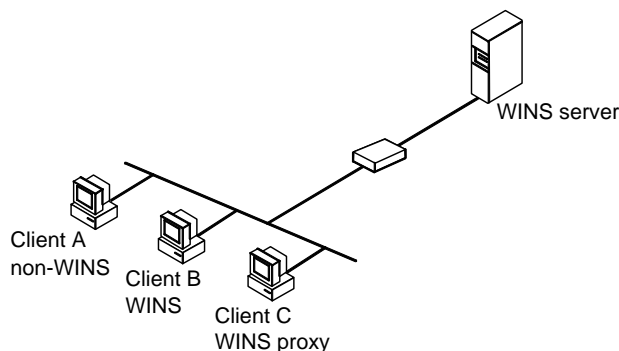
Example of Clients and Servers Using WINS

In this illustration, Client A is a not enabled for WINS, Client B is enabled for WINS, and Client C is a WINS proxy agent. The following table shows the typical steps that Client A and Client B take when resolving names.

Client A (Non-WINS)	Client B (WINS)
Client A sends a query (as a broadcast message) for Client X's IP address. Client X (not shown) is not on the local subnet. [1]	Client B queries the WINS server for Client A's IP address.
Client C (WINS proxy) intercepts the broadcast message and sends it directly to the WINS server. [2]	The WINS server responds directly to Client B with Client A's IP address. [3]
The WINS server responds directly to Client C with Client X's IP address.	If the WINS server is unreachable, the query fails. Client B switches to b-node and sends the query as a broadcast message on the local subnet.
Client C responds directly to Client A with Client X's IP address.	Client A receives the broadcast and responds directly to Client B.

[1] If Client X was on the local subnet, it would respond directly to Client A's query.

[2] Client C may already have the requested information in cache. If so, Client C responds directly to Client A without going to the WINS server.

[3] Both examples assume that the requested information is available in the WINS database on the server.

> **i** If a client computer running Windows NT also is DHCP-enabled and if the administrator specifies WINS server information as part of the DHCP options, the computer automatically will be configured with WINS server information.

In a WINS and broadcast name resolution environment, a WINS-enabled client computer will behave differently than a non-WINS-enabled client computer. These differences will be apparent in the way these clients handle *registration*, *renewal*, *release*, *and resolution*.
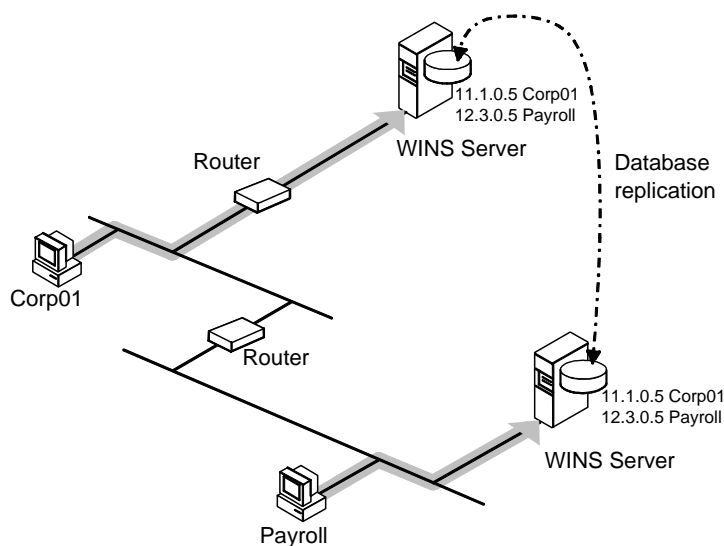
Name Registration

Name registration ensures that the NetBIOS computer name and IP address are unique for each device.

If WINS is enabled on the client: The name registration request is sent directly to the WINS server to be added to the database. A WINS server accepts or rejects a computer name registration depending on the current contents of its database, as follows:

● If the database contains a different address for that name, WINS challenges the current entry to determine whether that device still claims the name.

● If another device is using that name, WINS rejects the new name registration request.

● Otherwise, WINS accepts the entry and adds it to its local database together with a time stamp, an incremental unique version number used for replication purposes and other information. The new entry is marked *active*.

If WINS is not enabled on the client: For a non-WINS computer to register its name, a *name registration request* packet is broadcast to the local network stating its NetBIOS computer name and IP address. Any device on the network that previously claimed that name challenges the name registration (with a *negative name registration response*), resulting in an error for the computer attempting to register the duplicate name. If the *name registration request* remains unchallenged for a specific time period, the requesting computer adopts that name and address.

After a non-WINS computer claims a name, it must challenge duplicate name registration attempts (with a *negative name registration response*) and respond positively to name queries issued on its registered name (with a *positive name query response*). The *positive name query response* contains the IP address of the computer so that the two systems can establish a session.

Name Renewal

Client computers periodically are required to *renew* their NetBIOS name registrations with the WINS server. When a client computer first registers with a WINS server, the WINS server returns a message that indicates when the client will need to renew its registration, as follows:

- Default renewal interval for entries in the WINS database is six days.

- WINS clients try to refresh their name registrations whenever half of the renewal interval is expired.

- Primary and backup WINS servers should have the same renewal interval.

- An entry defined as *static* never expires.

If the entry is owned by the local WINS server, the name is released at the specified time unless the client has renewed it. If the entry is owned by another WINS server, the entry is revalidated at the specified time. If the entry does not exist in the database of the WINS server that owns the entry, it is removed from the local WINS database. A name renewal request is treated as a new name registration.

⚠ Incorrectly adjusting the renewal interval might adversely affect system and network performance.

Name Release

When a computer finishes using a particular name, it no longer challenges other registration requests for the name. This is referred to as *releasing a name*.

If WINS is enabled on the client: Whenever a computer is shut down properly, it releases its name to the WINS server, which changes the state of the related database entry from *active* to *released*. If the entry remains released for a certain period of time, the WINS server marks it as *extinct*, updates the version number, and notifies other WINS servers of the change.

- If a name is marked released at a WINS server, and a new registration arrives using that name but a different address, the WINS server immediately can give that name to the requesting client because it knows that the old client no longer is using that name. This might happen, for example, when a DHCP-enabled laptop changes subnets.

- If the computer released its name during an orderly shutdown, the WINS server does not challenge the name when the computer is reconnected. If an orderly shutdown did not occur, the name registration with a new address causes the WINS server to challenge the registration. The challenge fails and the registration succeeds, because the computer no longer has the old address.

If WINS is not enabled on the client: When a non-WINS computer releases a name, a broadcast is made to allow any systems on the network that might have cached the name to remove it. Upon receiving name query packets specifying the deleted name, computers simply ignore the request, allowing other computers on the network to acquire the released name.

> **i** For non-WINS computers to be accessible from other subnets, their names must be added as static entries to the WINS database or in the LMHOSTS */ names.cfg* file(s) on the remote system(s) because they will respond only to name queries that originate on their local subnet.

Name Resolution

With WINS servers in place on the internetwork, NetBIOS computer names are resolved using two basic methods depending on whether WINS resolution is available and enabled on the client computer. Regardless of which name resolution method is used, the process is transparent to the user after the system is configured.

If WINS is not enabled on the client: Name resolution works in the following manner:

1. Check the local name cache

2. Try broadcasting

3. Check the local LMHOSTS file (Microsoft only)

To find a particular computer, the client first checks its NetBIOS name cache. Note that, on computers running Microsoft networking products, this cache also contains those LMHOSTS entries which are marked with the *#PRE* tag, while on Advanced Server computers, this cache may possibly contain all mappings from the *names.cfg* file. If the name is not found in the cache, the non-WINS computer sends name query request packets (as broadcast messages) on the local subnet. (These broadcast messages normally cannot pass IP routers.) If local name resolution fails, the local LMHOSTS file is consulted on computers running Microsoft Networking components. These processes are followed whether the computer is a network server, a workstation, or another device.

If WINS is enabled on the client: Name resolution works in the following manner:

1. Try a WINS Server

2. Try broadcasting

3. Check the LMHOSTS*/names.cfg* file

4. Try the HOSTS file (Microsoft only)

5. Try DNS (Microsoft only)

To find a particular computer, the client first checks its NetBIOS name cache (see above). If the name is not found, the computer queries its primary and / or secondary WINS server:

1. In the following illustration, a client *name query request* is sent first to the WINS server. If the name is found in the WINS database, then the client can establish a session based on the address mapping received from the WINS server.
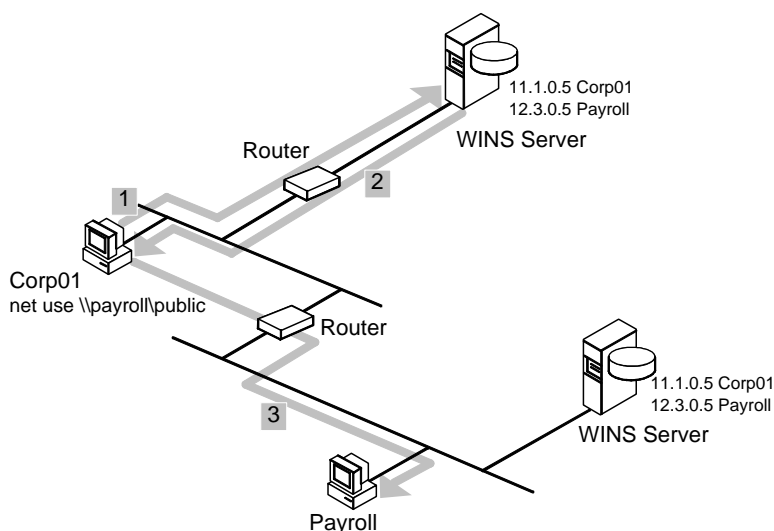
Processing a Name Query Request

2. If the WINS server query is unsuccessful and if the client computer is configured as an h-node, the client computer sends *name query request* packets (as broadcast messages) in the same manner as a non-WINS-enabled computer.

3. If the name still cannot be found, the local LMHOSTS file is checked. (Included in the search are any centralized LMHOSTS files referred to in #INCLUDE statements in the local file.) On Advanced Server computers, the name table containing the mappings from the *names.cfg* file normally is consulted at this point.

4. Advanced Server computers never use a HOSTS file or DNS for name resolution.

WINS servers accept and respond to UDP name queries. Any name-to-IP address mapping registered with a WINS server can be provided reliably as a response to a name query. However, a mapping in the database does not ensure that the related device is currently running, only that a computer claimed the particular IP address and that it currently is a valid mapping.

10.1.2.2   **WINS Proxy**

A WINS proxy is a WINS-enabled computer that helps resolve name queries for non-WINS enabled computers in routed TCP/IP intranets. By default, non-WINS enabled computers are configured as b-node which uses IP broadcasts for name queries. The WINS proxy computer listens on the local subnet for IP broadcast name queries.

When a non-WINS enabled computer sends an IP name query broadcast, the WINS proxy accepts the broadcast and checks its cache for the appropriate NetBIOS computer name-to-IP-address mapping. If the WINS proxy has the correct mapping in its cache, the WINS proxy sends this information to the non-WINS computer. If the name-to-IP-address mapping is not in cache, the WINS proxy queries a WINS server for the name-to-IP-address mapping.

If a WINS server is not available on the local subnet, the WINS proxy can query a WINS server across a router. The WINS proxy caches (stores in memory) computer name-to-IP-address mappings it receives from the WINS server. These mappings are used to respond to subsequent IP broadcast name queries from b-node computers on the local subnet.

The name-to-IP-address mappings that the WINS proxy receives from the WINS server are stored in the WINS proxy cache for a limited time. (By installation default this value is 6 minutes. The minimum value is 1 minute.)

When the WINS proxy receives a response from the WINS server, it stores the mapping in its cache and responds to any subsequent name query broadcasts with the mapping received from the WINS server.

Because the WINS server does not respond to broadcasts, a computer configured as a WINS proxy should be installed on subnets which contain computers that use broadcasts for name resolution.

i   To configure a Windows NT, Version 4.0, computer as a WINS proxy, you must manually edit that computer's registry. The *EnableProxy* keyword must be set to 1 (REG_DWORD). This keyword is located in the following key:
`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Netbt\Parameters`

10.1.3   **WINS and Dial-Up TCP/IP Networking Clients**

Dial-up TCP/IP networking clients provide remote networking for telecommuters, mobile workers, and system administrators who monitor and manage servers at multiple branch offices. Users of dial-up TCP/IP networking on Windows 95/98 or Windows NT computers can dial in to remotely access their networks for services such as file and printer sharing, electronic mail, scheduling, and database access.

Both Windows 95/98 and Windows NT support routing TCP/IP traffic over dial-up TCP/IP connections through several different types of dial-up TCP/IP networking servers, including the following:

● UNIX system servers that support either of the industry-standard point-to-point protocol (PPP) or serial line IP (SLIP) dial-up TCP/IP networking standards.

● Windows NT remote access service (RAS) servers.

● Third-party remote access service servers that support PPP and/or SLIP connections, such as those that are available from CISCO, 3COM, and Bay Networks.

Dial-up Windows 95/98 and Windows NT computers that are configured to route TCP/IP also can be configured to use WINS servers. For details, see your Windows 95/98 and Windows NT documentation.

Dial-up Windows 95/98 and Windows NT computers that are configured to route TCP/IP and use WINS can access remotely their networks for services, including Advanced Server and Windows NT file and print sharing, electronic mail, scheduling, and database access.

10.2 Planning for WINS Server Implementation

The number of WINS servers that an enterprise requires is based on the number of WINS client connections per server and the network topology. The number of users that can be supported per server varies according to usage patterns, data storage, and processing capabilities of the WINS server computer.

Planning for WINS server implementation on the network typically requires consideration of the issues presented in the following table:

Planning issue	Guideline
How many WINS servers are required to ensure distribution of name query and name registration loads throughout the network?	The location of routers on the network and the distribution of clients in each subnet should be considered first when deciding how many WINS servers are required. There is no builtin limit for the number of NetBIOS names that one WINS Server can handle. See the following sections: "Planning for WINS Client Network Traffic", "Planning for WINS Server Performance" and "Planning Replication Partners and Proxies".
Is the WAN bandwidth sufficient to support WINS server and WINS client name registration traffic?	See the next section, "Planning for WINS Client Network Traffic".
How many WINS servers are needed for disaster recovery, backup, and redundancy requirements?	See the following sections: "Planning for WINS Server Fault Tolerance" and "Planning for WINS Server Performance".
How can a planned distribution of WINS servers throughout the network be validated before instal-lation?	When planning a network configuration, a generally accepted approach is to consider the consequences of two simultaneous failures at different points on the network.

10.2.1   Planning for WINS Client Network Traffic

WINS clients generate the following types of network traffic:

- Name registration
- Name refresh
- Name release
- Name query

When a WINS-enabled client starts on the network, it sends a name registration request for the computer name, user name, domain name, and any additional Microsoft network client services running on the computer. In other words, when a WINS client starts on the network, it generates a minimum of three name registration requests and three entries in the WINS database.

Any server (either NT Server or Advanced Server for UNIX) usually registers more NetBIOS names than other WINS-enabled clients. The name registration requests generated by a server include the following:

- Server component
- Domain names
- Browser service name
- Additional network program and service names

10.2.1.1   WINS Client Traffic on Routed Networks

When planning for WINS client traffic on large routed networks, consider the effect of name query, registration, and response traffic routed between subnets.

Name requests and responses that occur at the daily startup of computers must pass through the traffic queues on the routers and may cause delays at peak times.

10.2.1.2   Daily Startup of WINS Clients

An active WINS client name registration in a WINS server database is replicated to all pull partners configured on that WINS server. After some time, the active name registration is replicated to all WINS servers on the network.

When a WINS client is turned off at the end of the day, it releases the name. When the computer is started the next morning, the WINS client registers the name again with the WINS server and receives a new version ID. This new, active name registration entry is replicated to the WINS server's pull partners as on the previous day.

Therefore, the number of name registration entries that are replicated each day is roughly equivalent to the number of computers started each day times the number of NetBIOS names registered at each computer.

On large networks (50,000 or more computers), the biggest traffic load may be the name registration requests generated when WINS clients start on the network. Fortunately, the difference in time zones in large enterprise networks provides some distribution of this WINS client startup load.

Roving User

Name challenge traffic occurs when a user stops the computer and then moves and starts the computer on a different subnet with another primary WINS server.

Typically, the name registration request is answered with a Wait for Acknowledgment message (100 bytes), and the new WINS server, assuming the active entry was replicated, challenges the IP address that is currently in its database for this name (Name Query packet, 92 bytes).

When there is no reply, as can be expected in this case, the WINS server repeats the challenge two more times and then updates the name registration entry with the new IP address and a new version ID. The new version ID indicates that the entry must be replicated from its new "owning" WINS server to other WINS servers on the network.

10.2.1.3   Estimating WINS Client Traffic

You can estimate WINS client traffic based on the behavior of the WINS clients as described in the preceding sections.

However, when estimating WINS client traffic, you also must consider the network topology and the design or configuration of the routers in the network. In some cases it may not always be possible to predict the traffic load on a specific network router because the routers may be designed or configured to autonomously route traffic based on factors other than traffic load.

10.2.2   Planning for WINS Server Replication Across Wide Area Networks

The frequency of WINS database replication between WINS servers is a major planning issue. The WINS database should be replicated frequently enough that the down-time of any WINS server will not affect the reliability of the mapping information in the database of other WINS servers.

However, when planning WINS database replication frequency, you do not want the frequency to interfere with network throughput. This could occur if replication frequency is set to a small time interval.

Consider the network topology when planning for replication frequency. For example, if your network has multiple hubs connected by relatively slow wide-area-network (WAN) links, you can configure WINS database replication between WINS servers on the slow links to occur less frequently than replication on the local area network or on fast WAN links. This reduces traffic across the slow link and reduces contention between replication traffic and WINS client name queries.

For example, WINS servers at a central local-area-network site may be configured to replicate every 15 minutes, while database replication between WINS servers in different WAN hubs might be scheduled for every 30 minutes, and replication between WINS servers on different continents might be scheduled to replicate twice a day. The following figure illustrates this example of variation in replication frequency.
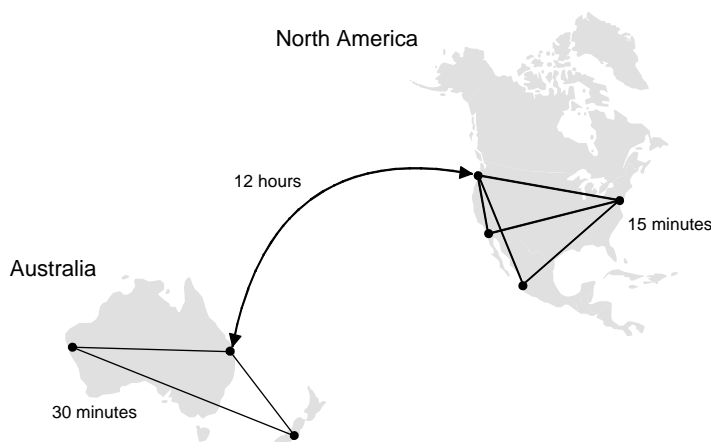
Example of an Enterprise-Wide Configuration for WINS Server Replication

10.2.2.1   Planning for Replication Convergence Time

The time needed to replicate a new entry in a WINS database from the WINS server that owns the entry to all other WINS servers on the network is called *convergence time*. When planning for WINS servers, you need to decide the acceptable convergence time for your network.

For information about convergence time, see the *Microsoft Windows NT Resource Kit Networking Guide*.

10.2.2.2   Planning for WINS Server Fault Tolerance

The two basic types of WINS server failures are as follows:

● A WINS server can crash or be stopped to perform maintenance.

● Network failures, including failures of routers and link stations.

For information about WINS server fault tolerance, see the *Microsoft Windows NT Resource Kit Networking Guide.*

10.2.3   Planning for WINS Server Performance

When planning for a large-scale power outage where many computers will go on line simultaneously, the conservative recommendation is that you plan to include one WINS server and a backup server for every 10,000 computers on the network.

The maximum rate at which a WINS Server can handle registrations and queries depends almost solely on the CPU performance, as long as the media bandwidth is clearly below saturation. Adding more CPUs to an Advanced Server computer running the WINS service does not improve this maximum rate, since the service is implemented within one UNIX process. WINS server replication response time can be improved measurably by placing the WINS database files on a less utilized disk.

After you establish WINS servers on an intranet, you can adjust the time between a WINS client name registration and name renewal. This is referred to as the Renewal Interval. Setting this interval to reduce the numbers of registrations can help tune server response time. (The Renewal Interval is specified in the **WINS Server Configuration** dialog box.)

> **i** The default value for the renewal interval (6 days) has been choosen with care! You should not configure shorter renewal intervals unless you have specific reasons to do so.

10.2.4 Planning Replication Partners and Proxies

Choosing whether to configure another WINS server as a push partner or pull partner depends on several considerations, including the specific configuration of servers at your site, whether the partner is across a wide area network (WAN), and how important it is to distribute changes throughout the network.

Only one computer configured as a WINS proxy should be installed on each subnet. (Configuring more than one WINS proxy per subnet can overload the WINS servers on the same subnet.)

In one possible configuration, one WINS server can be designated as the central server, and all other WINS servers can be configured as both push partner and pull partner of this central server. Such a configuration ensures that the WINS database on each server contains addresses for every node on the WAN.

Another option is to set up a chain of WINS servers, where each server is both the push partner and pull partner with a nearby WINS server. In such a configuration, the two servers at the ends of the chain would be push and pull partners with each other. Other replication partners can be established for your site's needs.

10.3 Setting Up a WINS Server

Advanced Server WINS is installed along with the Advanced Server software. Before setting up a WINS server, be sure to meet the following requirements:

1. UNIX threads are required in order to execute the WINS service. You have to use one of the following packages depending on the version of the operating system:

   – DCE-THR 2.0A20 (or a later version)

   – SIthreads

   The "SIthreads" package is included on the operating system CD with more recent operating system versions. This package replaces the previous version "DCE-THR". In this case, you should only use the "SIthreads" package.

> **i** The WINS service is the only Advanced Server service that is dependent on the UNIX threads package.

2. Install a NetBIOS that supports Advanced Server WINS. (The nbrfc package coming with the Advanced Server 4.0 software supports WINS.)

    To ensure compatibility with Microsoft networking components, it is recommended not to change the following NetBIOS related tuning parameters from *etc/conf/cf.d/mtune* (for details see section "Configuring NetBIOS Tunable Parameters"):

    ● NBRFCSTATBCAST   should be 0

    ● NBRFCWINSREG   should be 1

    ● NBRFCPRELOAD   should be 0

3. An Advanced Server running the WINS service (as well as every other WINS server) must be configured with static (not dynamic) IP addresses; they should not be DHCP clients. If your Advanced Server computer is a multihomed computer (a computer having more than one IP address), you have to decide which of the IP addresses shall be used by the WINS server. You do this by editing the NetBIOS configuration file *var/opt/nbrfc/conf/interfaces.cfg*. The interface to be used by the WINS server is marked with the line `used_by_wins=yes`.

    For details, see section "The interfaces.cfg file".

4. On a connected Windows NT Workstation computer,

    ▶   Install WINS Manager to be able to fully administer WINS (see below).

    ▶   Use the *wins* command to start and stop the WINS service manually from the Advanced Server command prompt.

    ▶   Use the *winsadm* command to perform some administrative tasks at the Advanced Server command prompt.

    Additional WINS administration can be performed using WINS Manager (see the following sections).

10.3.1 Installing WINS Manager

You can install the WINS Manager on any Windows NT Workstation computer running Version 3.51 or later. WINS Manager software is included with Advanced Server in the ASTOOLS or ASTOOLSD share. If WINS is already installed on MS WINDOWS NT Server computer, there is no need to install WINS Manager from the ASTOOLS share. You can then use the existing WINS manager also to administer the Advanced Server for UNIX WINS service, regardless of whether the Windows NT Server computer is running Version 3.51 or a later version.

To install WINS Manager

▶ From a Windows NT Workstation computer, log on to the domain in which your Advanced Server is configured.

▶ Establish a connection to the ASTOOLS or ASTOOLSD share on Advanced Server.

▶ Select the directory that corresponds with the version of Windows NT Workstation that your computer is running.

▶ Double-click on SETUP.BAT.

The SETUP.BAT script automatically installs workstation-based network administrative tools, including WINS Manager.

You then can add WINS Manager to the **Administrative Tools (Common)** Programs group.

10.4   Using the wins command

In an Advanced Server for UNIX networking environment, the availability of the WINS service can become an important aspect. Therefore, unlike other services within Advanced Server, the WINS Service is to some degree able to run independent of all other services, although there are some restrictions concerning administration.

You can start and stop the WINS server manually from the Advanced Server command prompt by using the *wins* command. This command can be used any time, regardless of whether Advanced Server - the SERVER service - is running or not.

▶ Use *wins start* to start the WINS service.

▶ Use *wins stop* to stop the WINS service.

▶ Use *wins status* to display a list of processes that are important for the WINS service.

Sample output of *wins status*:

```
AS/X WINS / NetBIOS processes:

UID      PID  PPID C   STIME  TTY  TIME   CMD
root     857    1 0  Sep 12    ?  0:16   ./lmx.wins
root   14109    1 0  Sep 12    ?  0:05   nbrfcdaemon −f20 −l2
root     862    1 0  Sep 12    ?  0:01   /var/opt/lanman/bin/lmx.ep

NetBIOS is connected to the local WINS server running on 144.145.179.150
```

You also can start and stop the WINS server manually from the Advanced Server command prompt by using the *net start wins* and *net stop wins* commands or remotely using the **Services** dialog box in Server Manager. However, these administrative actions are only possible if the Advanced Server is running.

The following statement is valid for the WINS service like for all other Advanced Server services: if you have configured the startup type *automatic* using the server manager, then the *net start server* command also starts the WINS service.

In the contrary the *net stop server* command ends all other services except the WINS service. Without a running Server service the WINS service continues to work - with restrictions: it is no more manageable with the WINS manager, however it continues to support name registrations, name queries, etc.

The configuration of the startup type *automatic* for the WINS service is equivalent to the existence of a corresponding entry of the service name in the *lanman.ini* file:

Example of lanman.ini file entry:

```
[ server ]
```

```
srvservices=alerter,netlogon,browser,wins
```

> **i** The *asx stop* command also stops the WINS service! If only the SERVER service has to be shutdown for administrative purposes you should use the *net stop server* command instead. In that case the WINS service can continue to do registrations and name resolutions, although it is no longer possible to administer the service using the WINS Manager.

10.5 Using the winsadm Command

Several Advanced Server WINS administrative tasks, such as backing up, restoring, and compacting the WINS data base, must be performed at the Advanced Server command prompt.

Use the **winsadm** command at the Advanced Server command prompt to back up, restore, compact, and dump the WINS data base.

For more information about this command, type **man winsadm** at the Advanced Server command prompt.

10.6   Using WINS Manager

To use WINS Manager, both Advanced Server and WINS must be running. Use WINS Manager to view and change parameters for any WINS server on the network for which you have Administrator privileges. WINS Manager Help is organized to provide information for each of the specific administrative and configuration tasks that you need to perform to manage WINS servers. See WINS Manager Help for specific task lists and instructions.

10.6.1   Viewing WINS Server Status

WINS Manager allows you to view administrative and operational information about WINS servers. When you open WINS Manager, the title bar shows the IP address or computer name for the currently selected server, depending on whether you used the address or name to connect to the server. The right pane displays basic statistics about the selected WINS server.

For detailed information about the fields displayed see Windows NT Help.

10.6.2   Configuring WINS Servers and WINS Client Behavior

You will want to configure multiple WINS servers on your network to increase the availability and balance the load among servers. When using multiple servers, each WINS server should be configured with at least one other WINS server as its replication partner. You should have multiple WINS servers installed on your network for the following reasons:

● To distribute NetBIOS computer name query and registration processing load.

● To provide WINS database redundancy, backup, and disaster recovery.

Configuring a WINS server includes specifying information about when database entries are replicated between partners. A *pull partner* is a WINS server that pulls in replicas of database entries from its partner by requesting and then accepting replicas. A *push partner* is a WINS server that sends update notification messages to its partner when its WINS database has changed. When its partner responds to the notification with a replication request, the push partner sends copies of changed records of its current WINS database to the partner.

For each WINS server, you must configure threshold intervals for triggering database replication, based on a specific time, a time period, or a certain number of new records. If you designate a specific time for replication, this occurs one time only. If a time period is specified, replication is repeated at that interval.

Use WINS Manager to configure WINS server management of WINS client mappings by using the configuration options in the **WINS Server Configuration** dialog box. The configuration options allow you to specify time intervals that govern WINS client behavior as described in the following table.

Configuration option	Description
Renewal Interval	Specifies the length of time that a registered name is valid without a refresh. A WINS client will try to refresh a registered name already after half of the interval is expired. If there is no successful refresh within the Renewal Interval; the name is marked as released. The default is six days.
Extinction Interval	Specifies the interval between when an entry is marked as released and when it is marked as extinct. The default is dependent on the renewal interval and, if the WINS server has replication partners, on the maximum replication time interval. The default is six days.
Extinction Timeout	Specifies the interval between when an entry is marked extinct and when the entry is finally scavenged from the database. The default is dependent on the renewal interval and, if the WINS server has replication partners, on the maximum replication time interval. The default is six days.
Verify Interval	Specifies the interval after which the WINS server must verify that old names it does not own are still active. The default is dependent on the extinction interval. The minimum allowable value is 24 days.

The extinction interval, extinction timeout, and verify interval are derived from the renewal interval and the partner replication interval. The WINS server adjusts the values specified by the administrator to keep the inconsistency between a WINS server and its partners as small as possible. The defaults for the four configurable timer values have been chosen with care and in general they should not be modified.

You can change the following configuration parameters using the **Advanced** option in the **WINS Server Configuration** dialog box.

Configuration option	Description
Logging Enabled	This option is ignored in Advanced Server WINS.
Log Detailed Events	Specifies whether the output to the event log is verbose. (This requires considerable computer resources and should be turned off if you are tuning for performance.). By default, this option is not checked.
Replicate Only With Partners	Specifies that replication occurs only with configured WINS pull or push partners. If this option is not checked, an administrator can ask a WINS server to pull or push from or to a non-listed WINS server partner. By default, this option is checked.
Backup On Termination	Specifies that the database will be backed up automatically when WINS Manager is stopped except when the computer is stopped. By default, this option is not checked.
Migrate On/Off	Specifies that static unique and multihomed records in the database are treated as dynamic when they conflict with a new registration or replica. This means that if they are no longer valid, they will be overwritten by the new registration or replica. By default, this option is not checked. You should have this option checked only a limited period of time. The purpose of Migrate On is to ease the process of making a B-node an H-node (WINS client). If set, the static nature of unique/multihomed names is compromised by WINS in that these records are now treated as pseudo- static. Pseudo-static means that a dynamic name registration will be allowed to overwrite a unique/multihomed static entry if the static address(es) are different and prove to be wrong.
Starting Version Count	Specifies the highest version ID number for the database. Usually, you will not need to change this value unless the database becomes corrupted and needs to start fresh. In such a case, set this value to a number higher than appears as the version number counter for this WINS server on all the remote partners that earlier replicated the local WINS server's records. WINS may adjust the value you specify to a higher one to ensure that the database records are replicated quickly to the WINS servers. This value can be seen in the **View Database** dialog box in WINS Manager.

Configuration option	Description
Database Backup Path	Specifies the directory where the WINS database backups will be stored. If you specify a backup path, WINS automatically performs a full backup of its database to this directory. WINS also uses this directory to perform an automatic restoration of the database in the event that the database is found to be corrupted when WINS is started. Do not specify a network directory.

10.6.3 Configuring Replication Partners

WINS servers communicate among themselves to fully replicate their databases, ensuring that a name registered with one WINS server is eventually replicated to all other WINS servers within the network. All mapping changes converge within the *replication period* for the entire WINS system, which is the maximum time for propagating changes to all WINS servers. All released names are propagated to all WINS servers after they become extinct, based on the interval specified in WINS Manager.

Use the **Replication Partners** command in WINS Manager to configure replication partners and replication partner properties.

Choosing whether to configure another WINS server as a push partner or pull partner depends on several considerations, including the specific configuration of servers at your site, whether the partner is across a wide area network (WAN), and how important it is to propagate the changes.

Replication is triggered when a WINS server polls another server to get replicated information. This can begin when the WINS server is started, and is repeated based on the configured update count or time interval, or by using WINS Manager to start immediate replication.

Replication also is triggered when a WINS server reaches a threshold set by the administrator. This is an *update count* for registrations and changes. In this case, the server notifies its pull partners that it has reached this threshold, and the other servers then can decide to pull replicated information.

It is always a good idea for replication partners to be both push and pull partners of each other. The primary and backup WINS servers *must* be both push and pull partners with each other to ensure that the primary and backup databases are consistent.

The following table describes the pull and push partner types of replication partners.

Replication partner type	Description
Pull partner	A pull partner is a WINS server that pulls (requests) WINS database entries from its push partners. The pull partner pulls new WINS database entries by requesting entries with a higher version number than the last entry it received during the last replication from that push partner. A pull partner can notify push partners that replication is needed by using either of the following methods: an arbitrary *time interval*, as configured by the WINS administrator, or immediate replication, initiated by the WINS administrator using WINS Manager.
Push partner	A push partner is a WINS server that sends a message to its pull partners that the WINS database has changed. When the pull partners respond to the message with a replication request, the push partner sends a copy of its new WINS database entries to the pull partners. The push partner notifies pull partners of replication require-ments by using either of the following methods: an arbitrary number of WINS updates (update count), as configured by the WINS administrator, or immediate replication initiated by the WINS administrator by using WINS Manager. If you modify the update count using WINS Manager, you then can open the **WINS Server Configuration** dialog box and check the **OK** button. As a result, the new value will take effect immediately.

10.6.4   **Managing Static NetBIOS-to-IP Address Mappings**

Static mappings are non-dynamic database entries of NetBIOS computer name-to-IP address mappings for computers on the network that are not WINS-enabled or for special groups of network devices.

Adding static mappings into a WINS database accomplishes two things. First, it allows nodes to resolve a name of a computer (which might not be capable of registering names with a WINS server) with a query to the WINS Server without having to resort to secondary resolution methods. Second, it prevents the WINS server from allowing another node to dynamically register the name.

i	Static mappings are not recommended for WINS-enabled clients.

Use the **Static Mappings** command on the Mappings menu in WINS Manager to view, add, edit, delete, import or filter static mappings.

i	Static entries that are not owned by the currently administered WINS server but replicated from a partner do not show up in the **Static Mappings** box.

Once a static name-to-IP address mapping is entered to the WINS server database, it cannot be challenged or removed except by an administrator who must remove it manually using WINS Manager. All changes made to the WINS server database using WINS Manager take effect immediately.

⚠️ A DHCP reserved (or static) IP address for a unique name in a multihomed computer overrides an obsolete WINS static mapping if the WINS server advanced configuration option **Migration On/Off** is checked "on."

Static NetBIOS name mappings can be any of the types listed in the following table.

Type option	Description
Unique	A unique name that maps to a single IP address. Contrast with multihomed type.
Group	Also referred to as a "Normal Group." When adding an entry to Group using WINS Manager, you must enter the computer name and IP address. However, the IP addresses of individual members of Group are not stored in the WINS database. Because member addresses are not stored, there is no limit to the number of members that can be added to a Group. Broadcast name packets are used to communicate with Group members. Contrast with Internet group type.
Domain	A NetBIOS name-to-IP address mapping that has 0x1C as the $16th$ byte. A domain group stores up to a maximum of 25 addresses for members. For registrations after the 25 th address, WINS overwrites a replica address or, if none is present, it overwrites the oldest registration. $\boxed{\mathbf{i}}$ In Windows NT 3.51, the "Domain" name type was called "Internet group". With Windows NT 4.0, the "Internet group" type has been generalized to include not only group names ending with 0x1C, see below.
Internet group	Internet groups are user-defined groups that allow you to classify resources such as printers for easy reference and browsing. The default 16th byte of an Internet group name is set equal to 0x20. An Internet group can store up to a maximum of 25 addresses for members. Internet group members can be added as the result of dynamic group registrations. However, a dynamic member does not replace a static member that is added by using WINS Manager or by importing the LMHOSTS file. Contrast with Group type.
Multihomed	A unique name that can have more than one address. This is used for multihomed computers. The maximum number of addresses that can be registered as multihomed is 25. For registrations after the 25th address, WINS overwrites a replica address or, if none is present, it overwrites the oldest registration. Contrast with Unique type.

10.6.4.1 Importing Static Mappings in Advanced Server WINS

Static entries may be entered manually or by importing an LMHOSTS file. If you have used a *names.cfg* file for static mappings before, this file is converted into LMHOSTS format during the installation procedure and saved under */var/opt/nbrfc/conf/names.imp*. (You can also manually use the tool *names2lm* at any time to convert an arbitrary *names.cfg* file or an old-style *nbrfc.cfg* file into LMHOSTS format to be used for importing static mappings into a WINS database.)

Keep in mind that static mappings are not useful and not recommended for WINS-enabled clients, so before importing a huge file make sure it contains only those mappings you really want to reside in the WINS database.

i During the process of importing static mappings, WINS Manager first connects to the server (not WINS) and tries to create temporary files under the C$ share. The C$ share is the root (/) share. Generally, the root directory on the UNIX system is "read-only." As a result, no clients — not even administrative clients — can create files under a UNIX system root share. This causes "access denied" errors. Prior to importing static mappings through WINS Manager, you must set the parameter *IgnoreUnixPermissions* to 1 in the Advanced Server Registry. You do not have to stop and restart the server.

⚠ Note that the IgnoreUnixPermissions=1 setting is effective only if the UnixQuotas parameter is set to 0.

For more information about the Advanced Server Registry, see the "Advanced Server Registry" chapter.

10.6.5 Advanced Configuration Parameters for WINS

Almost every configuration parameter that affects the behavior of WINS can be modified through WINS Manager. However, there are exceptions to this rule. Please refer to chapter "Advanced Server Registry" for a description of those -seldom used- WINS configuration parameters which can only be changed using the Registry Editor.

i You can impair or disable WINS if you make incorrect changes in the Registry while using the Registry Editor. Whenever possible, use WINS Manager to make configuration changes rather than using Registry Editor. If you make errors while changing values with Registry Editor you will not be warned because the Registry Editor does not recognize semantic errors.

10.7   Managing the WINS Server Database

Like any database, the Advanced Server WINS server database of address mappings
needs to be backed up and cleaned periodically. WINS Manager and the **winsadm**
command provide the tools you need to maintain the database.

This section describes how to view, back up, scavenge (clean), and compact the WINS
server database. For information on restoring and moving the WINS database, see
"Troubleshooting WINS Servers" later in this chapter.

10.7.1   Viewing the WINS Database

You can view actual dynamic and static mappings stored in the WINS database, based on
the WINS server that owns the entries. Use WINS Manager to choose the **Show Database**
command from the Mappings menu.

By default, the **Show Database** dialog box shows all mappings for the WINS database on
the currently selected WINS server. You can select a **Sort Order** option to sort by IP
address, computer name, time stamp for the mapping, version ID, or type. To view only a
range of mappings, choose the **Set Filter** button.

The **Show Database** dialog box displays several symbols within the Mappings active
column. Each symbol identifies specific conditions about each database entry.

Symbol	Description
✔	Represents an active entry that is registered with a WINS server.
-	Represents an interval between when an entry is marked as released , no longer active, and when it is marked extinct.
†	Represents an interval between when an entry is marked as extinct, and when it is removed from the WINS database.

10.7.2   Backing Up the Database

The following WINS server database files are stored in the */var/opt/lanman/wins* directory.
This directory was created when you installed Advanced Server.

File	Description
schema.gdb	This file is used by WINS to hold information about the structure of its database.
wins.gdb	This is the WINS database file.

⚠️   The *schema.gdb* and *wins.gdb* files should not be removed or tampered with in any
manner.

Advanced Server WINS automatically creates the *wins_bak* subdirectory under the directory
listed as the **Database Backup Path** to store backups of the *wins.gdb* and *schema.gdb*
database files. The default **Database Backup Path** is *C:\var\opt\lanman\wins*.

You can use WINS Manager to examine the current database backup path and to establish
a new one. By default, WINS performs complete database backups periodically (approxi-
mately every 24 hours) to the current (or default) database backup path. For more infor-
mation, see the Help topic "Backing Up and Restoring the Database" in WINS Manager
Help.

In addition to the backups that occur automatically, you may wish to perform manual
backups. You can back up the WINS server database using the Advanced Server *winsadm*
command, regardless of whether the WINS service is running or not:

To backup the WINS database:

▶   Log on to the Advanced Server WINS computer as *root*

▶   At the command prompt, type

```
winsadm -b
```

10.7.3   Scavenging the Database

The local WINS database should be cleared periodically of released entries and old entries that were registered at another WINS server and replicated to the local WINS server, but for some reason did not get removed from the local WINS database.

This process, called *scavenging*, is done automatically over intervals defined by the relationship between the **Renewal** and **Extinct** intervals defined in the **WINS Server Configuration** dialog box. You can also clean the database manually.

To manually scavenge the WINS database, choose the **Initiate Scavenging** command from the Mappings menu. The following table describes the results of scavenging a WINS database.

State before scavenging	State after scavenging
Owned active names for which the Renewal interval has expired	Marked *released*
Owned released name for which the Extinct interval has expired	Marked *extinct*
Owned extinct names for which the Extinct timeout has expired	Deleted
Replicas of extinct names for which the Extinct interval has expired	Deleted
Replicas of active names for which the Verify interval has expired	Revalidated
Replicas of extinct or deleted names	Deleted

10.7.4 Compacting the WINS Database

There is no built-in limit to the number of records that a WINS server can replicate or store. The size of the database is dependent on the number of WINS clients on the network. The WINS database grows over time as a result of clients starting and stopping on the network.

The size of the WINS database is not directly proportional to the number of active client entries. Over time, as some WINS client entries become obsolete and are deleted, there remains some unused space.

To recover space and improve performance, you should compact the database from time to time.

To compact the Advanced Server WINS database:

▶ Log on to the Advanced Server WINS computer as *root*.

▶ Stop the WINS server by typing the following command:

```
wins stop
```

▶ Compact the WINS database by typing the following command:

```
winsadm –c
```

▶ Start the WINS server by typing the following command:

```
wins start
```

10.8 Troubleshooting WINS Servers

This section describes some basic troubleshooting steps for common problems and also describes how to restore or rebuild the WINS database.

Verifying WINS Service Status

These error conditions can indicate potential problems with the WINS server:

● The administrator cannot connect to a WINS server using WINS Manager. The message that appears might be, "The Windows Internet Name Service is not running on the target machine or the target machine is not accessible."

● The Windows Internet Name Service may be down and cannot be restarted.

The first troubleshooting task is to make sure WINS is running.

To ensure that the WINS service is running:

► Use the *wins status* command at the Advanced Server command prompt to verify that the WINS service is running. The command should display three processes named "nbrfcdaemon", "lmx.ep" and "lmx.wins". You can also use the Services option in the Server Manager to verify that the WINS service is running.

► If necessary, use the *wins start* command to start the service. Observe possible error messages.

Even if the WINS service is running (but the SERVER service is not), you may get a message like "The Windows Internet Name Service is not running on the target machine or the target machine is not accessible".

To ensure that the WINS service is not only running, but also available for administration:

► Use the *asx status* command at the Advanced Server command prompt to verify that the SERVER service is running.

► If necessary, use the *asx start* command to start the service.

Resolving common WINS errors

To resolve "duplicate name" error messages

► Check if the WINS database contains name-to-IP address mappings for the name. If there is a static address record with the name and an inconsistent IP address, delete it from the primary WINS server database.

- Or -

► Check the MigrateOn box using the **Advanced** option in the **WINS Server Configuration** dialog box in WINS Manager.

To locate the source of "network path not found" messages on a WINS client

► Check the WINS database for the name. If the name is not present in the database, check whether the destination or target computer uses b-node name resolution. If so, configure this client to use WINS or add a static mapping for it in the WINS database.

► If the computer is configured as a p-node, m-node, or h-node and if its IP address is different from the one in the WINS database, then its address may have changed recently and the new one has not replicated to the local WINS server. Ask the WINS server that registered the address to perform a push replication with propagation to the local WINS server.

To discover why a WINS server cannot pull or push replications to another WINS server

► Use the **ping** utility to verify that each WINS server is running and is available to establish a connection.

► Ensure that each server is correctly configured as both a pull or push partner:

● If ServerA needs to perform pull replications with ServerB, make sure it is a push partner of ServerB.

● If ServerA needs to push replications to ServerB, it should be a pull partner of WINS ServerB.

To determine the configuration of a replication partner, check the values under the Pull and Push keys in the Registry. You can use the **Replication Partners** dialog box in WINS Manager to perform this task.

To determine why a WINS backup fails

► Make sure the path for the WINS backup directory exists.

To locate the source of "Access Denied" error messages when connecting WINS Manager to WINS

► Check that you are logged in as a member of the Administrators group.

Troubleshooting the WINS Server Database

If you have determined that the Windows Internet Name Service is running but you cannot connect to the server using WINS Manager, then the WINS database might have become unavailable or corrupted. If a WINS server fails for any reason, you can restore the database from a backup copy.

You can use the **winsadm** command to restore the WINS database from the WINS backup location specified in the Advanced Server Registry.

To restore a WINS database from the backup path specified in the registry

► Log on to the UNIX system as *root*.

► Shut down the WINS server using the *wins stop* command.

► Restore the WINS database from the WINS backup location using the `winsadm -r` command.

► Restart the WINS server using the *wins start* command.

11 Troubleshooting

This chapter describes how to troubleshoot a computer running Advanced Server for UNIX Systems. It identifies the various tools that are available to you for use in the trouble-shooting process and provides a high-level approach to use whenever troubleshooting is required.

Troubleshooting Advanced Server involves gathering data about the problem and analyzing that data to determine the specific cause of the problem. Advanced Server includes a number of data gathering tools. Additionally, more complex data gathering tools may be available from your support personnel.

This chapter introduces the various tools that are provided with Advanced Server and describes situations in which using them may be appropriate.

Administrators often can reduce the amount of time required to solve problems by observing the following guidelines:

- Be aware of and familiar with the tools and services that can be used for server trouble-shooting.

- Configure the available server utilities to gather the necessary data as a general practice.

- Assess the status of the server at regular intervals.

- Follow a logical and comprehensive procedure when attempting to isolate a server problem.

There will be times when a particular problem requires more complex data gathering than can be provided using the standard Advanced Server product package. In these situations, special debugging versions of the software may be needed to gather more detailed data about the problem. This type of data gathering may require the assistance of a technical support person to help with instructions on how to use the tools involved.

11.1   Advanced Server Troubleshooting Tools

Advanced Server provides a variety of tools that can be used as troubleshooting aids. These tools can be arranged into the following three categories:

● Tools used for assessing the status of the server.

● Tools used for automatic notification of the status of the server.

● Tools used for debugging specific server problems.

The following sections summarize the tools found in each category and briefly describe the use of each in a troubleshooting context.

11.1.1   Tools for Assessing the Status of the Server

Advanced Server includes multiple tools that can be used to assess the operational status of the server at any given time. As a server administrator, frequent assessment of server status will improve your ability to notice a problem or trend quickly.

Periodic review of server status will provide a fairly stable basis for understanding how a normal problem-free server appears. Over time, information that deviates from the norm will be an indication that something has changed and warrants your attention.

Tools for assessing the status of the server include the following.

11.1.1.1   Event Viewer

A number of events related to the daily operation of the server can be tracked using Event Viewer. These events are maintained in one of three event logs: *system, security*, and *application*. Administrators should develop and implement an event logging policy and include a review of event logs as a regular part of troubleshooting activities.

Administrators will find it particularly useful to characterize the typical use of the server by manipulating event log data using a spreadsheet or word processing program. This approach can be used to generate a standard operating profile of the server and can be used to predict trends in server usage.

For information about Event Viewer, see the "Concepts and Planning" manual.

i	Event logs also can be viewed using the **elfread** command. For more information, type **man elfread** at the Advanced Server command prompt.

11.1.1.2   Server Statistics

Advanced Server maintains detailed statistics about its current usage as well as cumulative usage over a particular period of time. It is always helpful to review these statistics on a regular basis as well as when a server problem is encountered.

Current Statistics

To view data about current server use, use Server Manager. This provides details about current client-server sessions and the resources being used by those sessions.

Cumulative Statistics

To view cumulative server usage data, use the **net statistics server** command at the Advanced Server command prompt. This command provides cumulative totals for a variety of server activities. Administrators who review the server statistics provided by using this command on a regular basis will find it easier to recognize and address changes in server operation.

The following statistics are maintained for the Advanced Server:

Statistic	Description
Statistics since	Tells when this set of statistics began (either at the last server startup or the last time the statistics were cleared).
Sessions accepted	Tells how many times users connected to the server.
Sessions timed-out	Tells how many user sessions were closed because of inactivity.
Sessions errored-out	Tells how many user sessions ended because of error.
Kilobytes sent	Tells how many KBytes of data the server transmitted.
Kilobytes received	Tells how many KBytes of data the server received.
Mean response time (msec)	Tells the average response time for processing remote server requests. This always will be 0 for UNIX system servers.
System errors	This does not apply to UNIX system servers.
Permission violations	Tells when a user attempts to access resources without the required permissions.
Password violations	The number of incorrect passwords that were tried.
Files accessed	The number of files that were used.

Communication devices accessed	Not supported on Advanced Server.

Statistic	Description
Print jobs spooled	The number of print jobs were spooled to printer queues on the server.
Times buffers exhausted	The number of shortages of big and request buffers. Always set to 0 for UNIX system servers.

11.1.1.3   Session Information

 Administration can display and control sessions between clients and the server. This information can be used to gauge the workload on a particular server.

► To display session information from a Windows NT Workstation computer or a Windows client computer using Server Manager

1. Start Server Manager.

2. Select the Advanced Server about which you want to view session information.

3. Click on the USERS button.

You also can display session information using the **net session** command at the Advanced Server command prompt.

> **i**   You may see sessions displayed that do not show user names. The sessions are a result of administrative activity and should not be deleted.

Closing Sessions

An administrator can disconnect a user from the server at any time. Closing a user session does not prevent the user from reconnecting.

► To disconnect a user session from a Windows NT computer or from a Windows client computer using Server Manager

1. Start Server Manager.

2. Select the Advanced Server about which you want to view session information.

3. Click on the USERS button.

4. Highlight the user and select the Disconnect button.

You also can disconnect a user session by using the **net session** command at the Advanced Server command prompt.

11.1.1.4   Open Resources

When a user uses a shared file, the file is open. Sometimes a file will be left open, perhaps even with a lock on it, because of an application program error or some other problem. Such files will remain open and unavailable to other users. Administrators can close these files.

► To close an open resource from a Windows NT computer or a Windows client computer using Server Manager

1. Start Server Manager.

2. Select the Advanced Server about which you want to view data.

3. Click on the IN USE button.

4. Highlight the open resource and select the Close Resource button.

You also can close an open resource by using the **net file** command at the Advanced Server command prompt.

11.1.1.5   Print Subsystem Event Logging

Advanced Server maintains a separate print log for each printer share and each UNIX system printer it uses. These log files record any message generated because of a printer fault or print job error.

An administrator should check these log files periodically to determine whether any such errors are occurring. The logs can be accessed from a client computer by linking to the PRINTLOG shared resource.

The logs also can be accessed from the server. They are in the following directory: */var/opt/lanman/shares/printlog*.

11.1.1.6   Remote Monitoring of Server

Advanced Server provides an SNMP-compliant monitoring service that can be used to monitor Advanced Servers from remote locations.

If you are an administrator involved with an Advanced Server network that spans multiple locations, you may want to take advantage of this service.

11.1.2   Tools Providing Automatic Status on the Server

Quick response time is critical when dealing with server problems. Being aware of a problem at the time it occurs can decrease greatly the effect that the problem may have on the server user community.

Advanced Server can be configured to notify specified users when a problem occurs. The UNIX system also can be configured to generate and notify the system administrator when problems occur. The following sections discuss these features.

11.1.2.1   Alerter Service

Advanced Server includes an Alerter service which can be used to notify specified users of the occurrence of a particular event. An administrator should use this service in order to make server problems known immediately. Prompt action to resolve server problems often can minimize their effect. The following examples illustrate situations that could generate alerts:

- The number of server errors exceeds a threshold set in the Advanced Server Registry.

- The number of bad access attempts exceeds a threshold set in the Advanced Server Registry.

- The number of bad password attempts exceeds a threshold set in the Advanced Server Registry.

- Errors were encountered during start of the Net Logon service.

- A printer is malfunctioning.

- A print request has been deleted or completed.

11.1.2.2   UNIX System and Advanced Server Features

One of the benefits of Advanced Server is the availability of the inherent scripting features provided by the UNIX operating system. Combining these features with the data gathering tools provided by Advanced Server, an administrator can create a powerful tool that can be used to assess the health of Advanced Server at any given time.

For example, using the UNIX system job scheduling feature (CRON), various data gathering tools provided by Advanced Server, and some of the standard UNIX system commands for checking file system integrity and free space, administrators can write scripts that perform various system and server checks and then send the results to UNIX system administrators at regular intervals.

11.1.3   Tools for Debugging Server Problems

Advanced Server includes UNIX system commands that can be used to troubleshoot server problems. These commands are executed at the Advanced Server command prompt. This section summarizes these commands and describes the roles they can play in trouble-shooting a server.

For more information about each command, type **man** *command* at the Advanced Server command prompt.

11.1.3.1   lmshell

The **lmshell** command is useful for emulating an MS-DOS client session when you do not have access to an actual MS-DOS client. This command is especially useful when trouble-shooting a connectivity problem between a client and server. Using the **lmshell** command, you can mimic a client logon and resource linking by executing the **net logon** and **net use** commands in *lmshell* at the Advanced Server command prompt.

11.1.3.2   lmstat

The **lmstat** command interrogates the server's shared memory image to gather a variety of data about the current state of the server. This command is especially useful when you want to determine which server process a client session is on.

Advanced Server is composed of a set of cooperative processes. When the server is running, enter the following command:

```
asx status
```

Executing this command generates a display *similar* to the following:

```
AS/X / NetBIOS processes:
 UID     PID   PPID   C      STIME   TTY  TIME    CMD
root   19183      1   0   15:17:09   ?    0:00    /var/opt/lanman/bin/lmx.ep
root   19808      1   0   15:17:09   ?    0:44    ./lmx.wins
root   19957      1   0   15:17:16   ?    0:00    lmx.extd
root   19787      1   0   15:17:08   ?    0:00    nbrfcdaemon  -f20 -12
root   19953      1   0   15:17:16   ?    0:01    lmx.browser
root   19916  19836   0   15:17:14   ?    0:04    lmx.srv -s 1
root   19988  19836   0   15:17:20   ?    0:04    lmx.srv -s 2
root   19945      1   0   15:17:16   ?    0:06    lmx.dmn
root   19949      1   0   15:17:16   ?    0:06    lmx.alerter
root   19836      1   0   15:17:11   ?    0:01    lmx.ctrl
```

In this example, there are two *lmx.srv* server processes (19916 and 19988). The server may have nine clients with current sessions.

How does the administrator know to which *lmx.srv* process a client is connected? Executing the **lmstat -c** command at the server prompt usually provides the answer. The system displays output *similar* to the following:

```
Clients:

BANANA~X (nwnum=0, vcnum=0) on 19916
ORANGE (nwnum=0, vcnum=0) on 19916
PEAR (nwnum=0, vcnum=0) on 19988
```

Notice that each client name has an associated process ID number. This is the process ID of the *lmx.srv* process that currently is serving that client. The vcnum value specifies whether this is the client computer's first VC or an additional one.

Being able to determine the process ID of the *lmx.srv* process that is serving a client is particularly useful when using the UNIX system **truss( )** command. This command requires a process ID as part of its startup arguments.

11.1.3.3   regconfig

The **regconfig** command is used to query or change Advanced Server Registry key information. You can use this command to change any value in the registry. (You also can use the Windows NT Registry Editor and the AS/U Administrator to change key values.)

The **regconfig** command also can be used to reinitialize the Advanced Server Registry with system defaults.

For more information about the registry, see chapter "Advanced Server Registry".

11.1.3.4   regcheck

The **regcheck** command is used to check and repair the Advanced Server Registry file. This command checks only the internal structure of the Advanced Server Registry file; it does not check the validity of any data that may be stored in it.

If the internal structure of the registry file is found to be invalid, use the **regcheck** command to make the necessary repairs.

11.1.3.5 samcheck

The **samcheck** command is used to check, dump, and fix the SAM database. You can use this command to determine whether the user accounts database has been corrupted and optionally, to fix it.

The **samcheck** command also can be used to output the contents of the user accounts database to stdout in human-readable format.

11.1.3.6 srvconfig

The **srvconfig** command is used to display the current default settings of all the server parameters in the *lanman.ini* file. (It also is a good way to check the location and spelling of any parameter you wish to modify.)

The *lanman.ini* file contains several parameters that you can modify to change. Default settings are used for most of these parameters. However, a certain number of them can be changed, overriding the default values set at server installation.

To display the default settings of the *lanman.ini* file, use the following command:

```
srvconfig -p | more
```

This command generates a listing of all of the parameters in the *lanman.ini* file and their default settings.

For more information about the *lanman.ini* file, see chapter "Lanman.ini File".

11.1.3.7 acladm

The **acladm** command is used to check and repair problems found in the access control list.

Be sure to examine the options that are available with this command before executing it. Type **man acladm** at the Advanced Server command prompt.

11.1.3.8   asxcheck

The **asxcheck** command can be executed to create the check file
$xASX/logs/asxcheck.<pid> with the result of several checks for a correct installation and
configuration of AS/X and NetBIOS.

Different tests will be made and saved with three keywords which have a specific priority.
For a quick view of the result you can evaluate the check file and look for *OK, WARNING* and
FATAL (e.g. with grep). If a situation with *WARNING* or *FATAL* priority is detected some more
information is available in the check file.

This file could be made available to the support staff in the event of any problems.

For more information about **asxcheck** type **man asxcheck** at the Advanced Server
command prompt.

11.1.3.9   asxinfo

The **asxinfo** command can be used to list information of relevance for the configuration and
operation of Advanced Server for UNIX and NetBIOS. In contrast to asxcheck, no check is
performed.

The information is written to the text file *$xASX/logs/asxinfo.<pid>*.

This file could be made available to the support staff in the event of any problems.

For more information about **asxinfo**, type man **asxinfo** at the Advanced Server command
prompt.

11.1.3.10   asxperf

The **asxperf** command can be used to get a "rough" overview of the CPU-time consumption
of the AS/X processes. The script also detects busy-looping AS/X processes.

For more information about **asxperf** type **man asxperf** at the Advanced Server command
prompt.

11.2   Troubleshooting Procedures

Troubleshooting Advanced Server involves using a systematic approach to isolate the
problem and then gathering detailed data in order to identify the specific module causing
the problem. The following sections provide simple procedures that you can use to isolate
a server problem. It then offers some suggestions on how to gather additional information
on the problem.

11.2.1   Isolating the Problem

Advanced Server runs on a UNIX system computer. The server depends upon a fully-functional NetBIOS network to perform its file and print serving functions.

A "NetBIOS network" typically includes the following components: an application that provides a NetBIOS protocol interface; an application that provides a network transport protocol interface, such as TCP/IP (although some transport implementations include NetBIOS within a common module); and an application that provides drivers for the network adapter interface (which also may be part of the transport module).

Every NetBIOS network component must be configured and operational in order for Advanced Server to function in a network environment. Additionally, similar modules must be functioning on the machine which is attempting to use the file and print services of Advanced Server, such as a Windows NT Workstation computer or Windows client computer.

When a NetBIOS network is not available, the system typically displays the following message when you start the server:

```
unable to post the name on any network: <name>.
```

Reviewing all of the modules involved in the end-to-end connection between a client and Advanced Server, it is easy to see that isolating a problem is the first step for problem solving in a client-server networking environment.

Before assuming that the problem is with the server, you must ensure that other networking software is functioning properly. This is particularly true with new installations in which the opportunity for a transport or physical network problem is the greatest.

It is fruitless to perform an exhaustive check of every layer of software for a problem which affects only a single client or user. Experience will help you to determine when to use a comprehensive problem isolation procedure or a server-specific problem isolation procedure. The following sections offer guidelines on how to perform both procedures. Use the one that best fits your current problem description.

11.2.2   Checking the Network

Before assuming that the server is the cause of all network problems, it is worthwhile to perform checks to verify the sanity of the network. This is particularly important when all or a very large portion of server users are reporting a problem at the same time.

Use the following steps to verify the sanity of the network.

Step 1: Verify the Status of the Physical Network

The first item to check is the physical network. The majority of today's networking hardware provides status indicators that can be used to assess the state of the various network links (for example, 10-Base-T Hubs use LEDs). Always check these links for any signs of problems with the physical network such as excessive re-transmissions, Link Integrity mismatches, and jabber conditions.

Even in cases in which only a single client is affected, never assume that is it not a bad cable connection. For a single client it is easy to check to determine whether the problem occurs regardless of which server the client tries to use.

If a client cannot "see" anything on a network that is otherwise functioning without incident, then it is safe to assume that the problem is related to that client's network configuration. If however, that same client can see other nodes on the network but cannot connect to a particular server, then the network path to that server, the server itself, or the account being used by that client are likely candidates for trouble.

There are several third-party products available that can be used to monitor the health of the physical network. It is worthwhile to check network traffic periodically with one of these devices to see whether there are problems occurring with the physical network.

Step 2: Verify the Transport Protocol Status

If the physical network appears to be functioning properly, the next step is to determine whether the various computers on the network can "see" each other from the perspective of a transport protocol. Most transport protocol applications include a connectivity test tool that can be used to verify connectivity at the transport level between a client and the server over the network.

If you cannot PING a server machine from a particular client, then neither will that client computer be able to connect to the server. If you cannot PING a server from several client computers, then one of the following conditions may be present: the server is not running, the transport protocol is not running, or there is a configuration problem that is disrupting network connectivity.

Review the recommendations in your transport protocol software documentation. If appropriate, continue with the procedures described later in this section on assessing the status of the NetBIOS protocol and Advanced Server.

Step 3: Verify the NetBIOS Protocol Status

Check the NetBIOS protocol layer. Most NetBIOS modules provide test tools that test the connectivity between NetBIOS names over the network.

Connectivity between nodes using TCP/IP may be available but if connectivity between NetBIOS names is not working then Advanced Server will not work. All Advanced Server communications are based on NetBIOS name sessions. Use the test tools provided with your protocol software to verify NetBIOS level connectivity. If you find a problem, isolate it according to the information provided with the NetBIOS protocol documentation.

Step 4: Verify UNIX System Functionality

If all of the network connectivity modules check out properly, the next item to verify is the UNIX operating system on the computer hosting Advanced Server. The operating system provides a variety of log files and system checks that can be performed to verify proper operation. For information on these checks, see your UNIX system administrator documentation.

Advanced Server is particularly sensitive to the following system problems:

● Insufficient disk space in critical file systems such as *root* (/) or */var.*

● Insufficient system memory causing excessive swapping.

● CPU bound conditions.

● Unbalanced disk loads.

● Improperly tuned kernel parameters such as maximum number of open files or maximum number of locks.

Operating system problems usually will affect all or most client computers connected to the server. Do not spend much time on this step if you are troubleshooting an individual client problem.

Step 5: Isolating Problems on the Advanced Server

If you determine that all of the underlying software is functioning properly, then you should check Advanced Server for problems. Problem isolation on the server often is dependent on the type of problem reported by the user community.

If only a single user is experiencing a problem, then you can narrow your focus quickly to the operations that this user is attempting to perform.

If a group of users is experiencing problems but many other users are not, then you should look for a common thread among the users with problems. For example,

● Are they on the same hub?

● Are they using the same applications or printers?

● Are they on the same *lmx.srv* process?

● Are they members of the same Advanced Server group?

If all users of a server are experiencing a problem, then you should start with more basic assessments of the state of the server. These are described in the following sections.

Is the Server Running?

It is worthwhile to verify that the server is actually running. You can do this easily by entering the following command at the system command prompt:

```
asx status
```

The system display should include the following (at a minimum):

```
AS/X / NetBIOS processes:

UID    PID  PPID C   STIME TTY TIME CMD
root 19787    1 0 15:17:08 ?   0:00 nbrfcdaemon
root 19916 19836 0 15:17:14 ?   0:04 lmx.srv -s 1
root 19945    1 0 15:17:16 ?   0.06 lmx.dmn
root 19836    1 0 15:17:11 ?   0:01 lmx.ctrl
```

This display indicates that the three required server processes are in fact running, the daemon (*lmx.dmn*), the control process (*lmx.ctrl*) and at least one worker process (*lmx.srv*). You also may see other processes, such as *lmx.browser* and *lmx.alerter*.

The NetBIOS process *nbrfcdaemon* is always required.

Additional multiple worker processes, each with a unique number displayed at the end of the line, may be displayed. The server spawns new worker processes based on the number of clients supported by the server. As more client sessions are started, more *lmx.srv* processes may be started, each with a unique process ID and number. This is normal.

If the server is not running, use the **net start server** command at the command prompt.

Are All of the Server Services Running?

If one of the required server processes is not running, determine whether all of the server services started properly. A situation can occur when several server processes are running but you still cannot use the server because a particular service did not start. This is especially true for the Net Logon service. To check which services are running, enter the following command at the command prompt:

```
net start
```

The system displays a list of the services that currently are active on the server.

It is critical that the Net Logon and Server services are displayed. If they are not shown, then the server has a problem. Often the Net Logon service will not start because of a problem with the server name, domain name, or domain configuration.

Check the error logs for problems as described later in this chapter.

Are There Messages in the Error Logs?

Always check the error logs used by the server. You can view the system, security, and application logs from a client computer using Event Viewer or at the system console using the **elfread** command. You also can view the logs in the PRINTLOG share area if there is a printing-related problem. For problems related to server startup, you can check the *lmxstart.log* located in the */var/opt/lanman/logs* directory.

If there are entries in any of these logs, save them for future reference. Never discard or overwrite error messages since they may indicate the cause of the problem. These logs may have to be supplied to support personnel at a later date.

The following message is particularly indicative of a server problem:

```
An Advanced Server for UNIX systems process with pid <no> unexpectedly
terminated.
```

This message indicates that a server process has encountered an unexpected error. Depending on how your server is configured, there may be a core file located on your system.

If the value of the CoreOk keyword is set to 1 (yes) in the Advanced Server Registry, then a core file is located somewhere on the system. The CoreOk value is in the following key:

```
SYSTEM\CurrentControlSet\Services\AdvancedServer\ProcessParameters
```

Go to the *root* directory, and execute the following command to search the file system for core files:

```
find . -name "core*" -print
```

Save any files that you may find. If the coreok parameter is set to no, then core files will not be created. You may want to set the coreok keyword to yes in order to capture core files which are useful for debugging purposes.

Are All of the Server Resources Properly Shared?

Some server resources are shared automatically every time the server is started. These resources are used in the background by clients while performing other server activities.

The list of resources shared by default are as follows:

```
ADMIN$
C$
D$
DOSUTIL
IPC$
LIB
NETLOGON
OS2UTIL
PRINTLOG
PRINT$
USERS
```

The resources followed by a dollar sign ($) are special resources required for server administration and communication. (An additional special resource — REPL$ — is available when the Directory Replicator service is running.)

Never attempt to delete or re-share these resources. If any of these resources are absent, the server will not function properly. If you detect that one of these resources is missing, stop and restart the server to determine whether they are shared at server startup. If they are not displayed, contact your service representative.

The remaining resources are default resources typically used by clients during logon (NETLOGON), to connect to home directories (USERS), and to access utilities or error logs (DOSUTIL, OS2UTIL, PRINTLOG). These items may be deliberately absent from your server. However, if you did not unshare them, then a problem with the server caused them to be removed.

Can the Server be Contacted From the Console?

A simple test can be conducted to determine whether the server is communicating over the network. Issue the following command at the system console.

```
net view
```

The system displays the name of the server and other servers operating in the same domain. If your server name is displayed, execute the same command, adding the server name:

```
net view \\asutrial
```

The system displays a list of shared resources *similar* to the following:

```
Shared resources at \\asutrial

Advanced Server for UNIX Systems


Share name Type      Used as      Comment
DOSUTIL    Disk                   DOS Utilities
LIB        Disk                   Programming Aids
NETLOGON   Disk                   Logon Scripts Directory
OS2UTIL    Disk                   OS/2 Utilities
PRINTLOG   Disk                   LP printer messages
USERS      Disk                   Users Directory
```

Other entries may be displayed if you added shared resources to your server.

If either of these commands fails consistently, then there is a problem with broadcast communications over the network. If these commands succeed, you can use the tests in the next section.

Is the Server Supporting a Maximum Number of Users?

When a connectivity problem occurs, ensure that your server has not exceeded the maximum number of clients that it is configured to support. This number is indicated by the maxclients parameter in the server *lanman.ini* file. It can be displayed using the **srvconfig - g maxclients** command.

Has the Advanced Server Registry Been Corrupted?

Execute the **regcheck -C** command to determine whether the internal format of the registry file has been corrupted. If this command detects corruption, execute the **regcheck -R** command to repair the registry file.

If invalid values have been entered in the Advanced Server Registry, the you can use the **regload** command to reinitialize all registry values to their defaults.

Can the Server be Contacted From a Client?

Attempt to log on to the server from a client computer. If the logon is successful, link a virtual drive ID to a shared resource. Then, view the contents of the linked drive.

If you have problems with these steps, isolate each problem using the following procedure.

11.2.3   Troubleshooting a Shared Resource

If you can communicate with the server but cannot access a shared resource, check the following items:

1. Verify that the shared resource exists by using the **net view** *servername* command. If the shared resource name is not displayed, then it does not exist. In that event, you must re-share the resource.

2. Link to the shared resource while logged in as administrator. If this fails and the resource exists, then the resource may be shared incorrectly. Delete and re-share the resource. If this succeeds, then proceed to the next step.

3. If the resource is a disk resource, check both levels of permissions associated with the shared resource. First check the share permissions using Server Manager. Then check the permissions on the shared directory using Windows Explorer at an administrative client.

    Verify that the resource can be used using either group membership or on a per-account basis for that particular user. Also, verify that the access permissions on the resource allow the desired action to be performed (for example, the user has read-only permission but is attempting to edit a file). Also verify that the maximum user limit for a particular shared resource is not being exceeded.

4. On the shared resource, check the file attributes and the UNIX system access permissions.

    If necessary, use the MS-DOS **attrib** or the OS/2 **chmod** command to change the file attributes. You also can use the Properties menu in Windows Explorer.

    Use the **udir** command to display UNIX system permissions (user, owner, group).

11.3   Differences Between System Access Permissions

This section describes the differences between the access permissions of the UNIX system and a network running Advanced Server software. It explains the UNIX system access permissions — how to display them and how to change them with the **uchmod** command. The **uchmod** command is available as both MS-DOS and OS/2 executable command and resides in the DOSUTIL and OS2UTIL shared directories.

An Advanced Server is a computer that also is running the UNIX operating system. All of its files also are UNIX system files with their own set of UNIX system access permissions.

UNIX system access permissions on an Advanced Server file will be compatible with the Advanced Server *only if the UNIX system access permissions are changed explicitly.* If these UNIX system access permissions are modified, they can prevent access to a file or directory even if Advanced Server access permissions grant access.

For example, if a user has Advanced Server change permission for a file, then this file needs to have the UNIX system equivalent of change permission (RWX) in order for the user to perform all of the operations allowed by the Advanced Server change permission (read, write, create, and execute).

However, if you changed the file's UNIX system permissions, eliminating the write (W) permission for everyone other than the file's owner, then no one but the owner can alter or remove the file, regardless of the generous Advanced Server permissions.

Advanced Server automatically adds the appropriate UNIX system access permissions when files and directories are created on the network. These permissions are determined by two keywords in the Advanced Server Registry: UnixFilePerms and UnixDirectoryPerms.

Check whether the values assigned to these keywords provide the desired UNIX system protection for your files and directories. These keywords are in the following key:

`\SYSTEM\CurrentControlSet\Services\AdvancedServer\FileServiceParameters`

For more information, see the chapter "Advanced Server Registry".

For more information about security and access permissions, see the manual "Concepts and Planning".

11.3.1 UNIX System Access Permissions

The UNIX system assigns access permissions to all directories and files. These UNIX system access permissions, together with Advanced Server file and permissions, determine whether you can read, write, or create directories and files on the server.

> **i** It is not necessary to know the UNIX system access permissions assigned to directories and files unless these access permissions prevent access when Advanced Server permissions appear to allow access.

Access is determined through access permissions assigned by Advanced Server and the UNIX system. Advanced Server access permissions assigned to files or directories are based on the access permissions assigned to the individual user. These access permissions can be found in the access control list that resides on Advanced Server.

11.3.1.1   UNIX System Group Permissions and Advanced Server

The effect of setting UNIX system group permissions on Advanced Server files is limited. In the UNIX system, the group field is used for storing information about file attributes. When a file is accessed from a client computer, its group may change to reflect its attributes (for example, to DOS----). Therefore, it is inadvisable to rely on UNIX system group permissions to restrict access to Advanced Server files.

11.3.1.2   UNIX System Permissions on Directories

UNIX system permissions on all directories in the path leading to a file must be at least read and execute (RX) for users to access files on Advanced Server successfully.

11.3.1.3   Turning Off UNIX System Permission Checking

If the protection of Advanced Server files provided by UNIX system permissions can be ignored, and if it is appropriate to rely solely on Advanced Server permissions to manage file access, you can set the IgnoreUnixPermissions keyword to 1 (ignore UNIX system permissions) in the Advanced Server Registry. This keyword is in the following key:

```
\SYSTEM\CurrentControlSet\Services\AdvancedServer\FileServiceParameters
```

This will cause Advanced Server to ignore all UNIX system permissions on files except for read-only permissions, which are translated into read-only file attributes when client computers attempt to access files.

> ⚠️ Note that the setting IgnoreUnixPermissions=1 is effective only if the UnixQuotas parameter is set to 0.

For more information about the Advanced Server Registry, see the "Advanced Server Registry" chapter.

11.3.1.4   UNIX System File and Directory Permissions

UNIX system file and directory permissions are assigned by a default set of access permissions on the system upon creation of files and directories. The UNIX system distinguishes the following three types of users with respect to access permissions:

1. **User** — If you own a UNIX system file or directory, you can assign it access permissions for yourself. For example, to prevent unauthorized users from executing a program, you can assign execute permissions to yourself only.

2. **Group** — You can assign permissions for other users in your group to files and directories that you own. When your administrator creates your home directory, you are automatically assigned to the UNIX system group *other*, as are all others with home directories. This assignment enables you to share data easily with other network users, but prevents UNIX system users in different groups from reading or changing your files.

3. **Other** — You can assign access permissions to files and directories that you own for all UNIX system users other than yourself and the users in your group. Depending on your needs, you can allow these other users to read or change your files and directories or you can prevent such access. Restricting access to others does not affect your own access to the files and directories.

When a user attempts to access a file or directory, access to the server is allowed or denied depending on the permissions assigned to that user.

11.3.1.5   Understanding UNIX System Access Permissions

You can use the **udir** command to check the current UNIX system access permissions of any file or directory. The Modes column of the **udir** command shows the UNIX system access permissions for each file and directory. These access permissions are displayed as three sets of three access permissions each. The first set shows the user/owner access permissions. The second set shows the group access permissions. The third set shows the access permissions provided to other UNIX system users. Following are the access permissions abbreviations and their meanings:

Permission	Description
r	Permission to display or read the file or directory.
w	Permission to modify or write to the file or to create or remove files in the directory.
x	Permission to execute the file or move to the directory. Client application files do not need execute permission because they execute under the client computer's operating system, not the UNIX system.
-	The relevant permission is denied.
l	Mandatory locking is enabled.

The following access permissions rarely appear in a display but are described here for completeness:

Permission	Description
s	Whenever a file with this permission is executed, regardless of who executes it, the invoked process takes on the identity of the file's owner (or group) for the duration of the execution.
t	If space is available, a text file with this permission stays in swap space after execution. This permission speeds UNIX system program loading.

11.3.1.6 Changing UNIX System Access Permissions

You can use the **uchmod** command from a client computer to change the UNIX system access permissions for files and directories.

With the **uchmod** command, you enter only the access permissions you want to change. You do not have to enter all of the permission characters. For example, to change the write permission on a file named *budget* so that it cannot be modified, you would enter the following command:

```
uchmod -w budget
```

11.3.1.7 Maintaining Permissions for Specific Files

Some programs, such as Microsoft Word, maintain temporary files by renaming the source file to a temporary name. Then, when the user saves the file, these programs create a new file with the name of the source file. The temporary file is then deleted.

The permissions that have been assigned to a specific file are not assigned to the new file which has the same file name. These permissions apply only to the original file which was renamed to the temporary file name and then deleted. The updated file is treated as a completely new file by Advanced Server which means it inherits the permissions of the directory in which it resides.

Files that are likely to go through this kind of updating process should be maintained in directories that have the permissions you want these files to inherit.

11.4 Solving Browsing Problems

Some of the common problems that you may encounter while using the Computer Browser service are listed below, followed by recommended resolutions.

Problem

The display that results from executing a **net view** command from a LAN Manager server does not contain any of the Advanced Server computers that are in the domain.

Resolution

Edit the Advanced Server Registry to change the value of the LmAnnounce keyword to 1 (yes). Advanced Server then will broadcast LAN Manager-style server announcements. The LmAnnounce keyword is in the following key:

```
System\CurrentControlSet\Services\LanmanServer\Parameters
```

The server must be stopped and re-started for the change to take effect.

Problem

The browse list on the backup domain controller does not contain all of the domain servers. For example, the list of servers that is displayed as a result of executing the **net view** command from a backup domain controller is incomplete.

Resolution

It can take as long as 12 minutes for the system to update the browse list. The administrator can edit the Advanced Server Registry on the backup domain controller to change the value of the BackupUpdate keyword to the value (in seconds) for which updates are desired. Note that increasing the browse update frequency will generate increased network traffic.

The BackupUpdate keyword is located in the following key:

```
SYSTEM\CurrentControlSet\Services\Browser\Parameters
```

The Computer Browser service must be stopped and restarted for the change to take effect.

For more information on changing registry values, see chapter "Advanced Server Registry".

11.5 Solving Printing Problems

Some of the common problems that may arise when using shared printer queues are listed below, followed by recommended resolutions.

Problem

Windows NT client computers cannot connect to the printer.

Resolution

You must associated the printer with an appropriate driver. Follow these steps to change the printer-driver association:

1. From a Windows NT client computer, select the printer whose driver you wish to change in the **Printers** folder.

2. Click on **Printer Properties**. If you receive a Printer Properties error, select "No". This may occur if a valid printer driver already has been installed.

3. Select the correct printer driver.

4. Share the printer if it is not already shared.

You may need to insert the Windows NT CD to obtain the appropriate driver. The system will confirm that the printer driver is being uploaded to the Advanced Server.

Problem

Changes made to Windows NT client printers and jobs are not displaying automatically.

Resolution

Manually refresh the screen by pressing F5 key. This is required to update the screen whenever you pause, resume, delete, or add printers.

Problem

Printer name is invalid.

Resolution

Ensure that the printer name does not contain any spaces, and that the share name is the same as the printer name.

Problem

There is no separator page.

Resolution

You cannot use Windows NT to create separator pages in Advanced Server. Use the **net print** command at the Advanced Server command prompt to create and modify separator pages.

Problem

Print jobs in the queue are not printing.

Resolution

1. Verify that the printer cable is connected according to the printer manufacturer's instructions.

2. Verify that the printer is turned on, selected (on-line), has paper, is not jammed, and has no other obvious problems.

3. Verify that the printer or printer queue has not been paused, held, or is in error. If it has been paused or held, continue or restart the printer or print queue.

4. Verify that you can print from the UNIX system console. If not, consult your UNIX system documentation.

Problem

A shared client printer is connected to parallel port LPT1 or PRN on your client computer. Print jobs sent to that printer over the network (rather than locally) do not print although print jobs sent from your owner client computer do print, indicating that the printer itself is operational.

Resolution

Enter the **net use** command. If the display shows that the LPT1 or PRN port ID is linked to the printer, unlink that port ID; then link an unused port ID to the printer. The LPT1 or PRN port must be reserved for the physical connection to the printer.

Problem

You are using an application at a client to which a shared client printer is connected and occasionally your keyboard locks for a few seconds, especially when a print job is in progress.

Resolution

This hesitation at the keyboard is normal under these circumstances, especially when the printer is connected to a serial port.

11.6   Solving Problems With Unknown File Systems

Advanced Server recognizes a subset of the UNIX system file systems. By default, the server knows only the following types of file systems:

- hs or cdfs

- nfs

- s5

- sfs

- ufs

- vxfs

- memfs

If you are using a file system other than those recognized by Advanced Server, it will be treated as an s5 file system.

If you want *all* of your unknown file systems to be treated as a type other than s5, set the fsnosupport parameter in the [fsi] section of the *lanman.ini* file to the name of a recognized file system. Then, stop and restart the server.

If you want to set each unknown file system *individually* to a specific known file system, follow these steps:

1. At the UNIX system prompt, type this command and press ENTER:

   ```
   df -n pathname
   ```

   Replace *pathname* with the name of the path to the unknown file system.

   The system displays the mount point and file system type as specified by the UNIX operating system.

2. Set the fsmap parameter in the [fsi] section of the *lanman.ini* file as follows:

   unknown:s5,nfs:nfs,vxfs:ufs,sfs:ufs,unixfilesystem:filesystem, ...

   Replace *unixfilesystem* with the name of the file system type returned in Step 1.

   Replace *filesystem* with the name of the Advanced Server file system type you want to use.

3. Stop and restart the server.

Advanced Server now will map the UNIX file system to the recognized file system you specified.

For information on how to edit the *lanman.ini* file, see chapter "Lanman.ini File".

11.7 File names with umlauts are not visible after an upgrade

AS/X uses a different character set following an update of LAN Manager/X V2.0 or V2.2 or Advanced Server for UNIX V3.51A10.

As a result, Advanced Server for UNIX file and directory names can no longer be displayed by the client after an update. A utility is supplied with Advanced Server for UNIX which renames file and directory names containing umlauts such that these names correspond to the new character set.

Actions after an update:

The *$xASX/etc/mapnames* script creates a shell script called *$xASX/etc/mapnames.sh* when it is invoked for the first time. This program is invoked automatically when the *asxserver* package is installed (or a corresponding service pack). When the script has been executed, a lock file *$xASX/etc/.map.done* is created which prevents a further run. The *$xASX/etc/mapnames* script is started in the background and only terminated fully when the lock file is available. The *$xASX/etc/mapnames.sh* script must not be called before this.

The *$xASX/etc/mapnames.sh* script renames all files and directories whose names contain an old-style umlaut. Since it may take several hours to execute this shell script, you should ensure that the system is not powered down in the meantime.

To repeat this procedure, you have to delete the *$xASX/etc/.map.done* file first as otherwise the *$xASX/etc/mapnames.sh* script will not be created again. You then call the *$xASX/etc/mapnames* script, and when this has ended the newly created *$xASX/etc/mapnames.sh* script.

12 Advanced Server for UNIX - directories and files

Following the installation of the network and server software, the following additional paths are created on your system:

- */var/opt/nbrfc*
- */var/opt/lanman* (contained in the environment variable *$xASX*)

The following sections list the most important Advanced Server for UNIX files:

Path: /etc/	Comment
init.d/asx	Start/stop script for NetBIOS and server
init.d/asx_name	Only required if pre-installed at factory
init.d/asx_srv	Start/stop script for the server, linked to *rc2.d* and *rc0.d*
init.d/asx_wins	Start/stop script for the WINS service
init.d/ms_srv	Start/stop script for the server
init.d/nbrfc	Start/stop script for NetBIOS
rclmx	Advanced Server for UNIX environment variables
rc0.d/<xxx>asx_srv	Link to */etc/init.d/asx_srv* for automatic stop. <xxx> represents *K19,* for example
rc2.d/<xxx>asx_srv	Link to */etc/init.d/asx_srv* for automatic start. <xxx> represents *S99,* for example
rc0.d/<xxx>asx_wins	Link to */etc/init.d/asx_wins* for automatic stop. <xxx> represents *K20*, for example
rc2.d/<xxx>asx_wins	Link to */etc/init.d/asx_wins* for automatic start. <xxx> represents *S98*, for example
rc0.d/<xxx>nbrfc	Link to */etc/init.d/nbrfc* for automatic stop. <xxx> represents *K68*, for example
rc2.d/<xxx>nbrfc	Link to */etc/init.d/nbrfc* for automatic start. <xxx> represents *S70*, for example

Path: /opt/	Comment
readme/asx.D/	Readme/manual information (German)
readme/asx.GB/	Readme/manual information (English)

Path: /usr/bin/	Comment
NET	Link to */var/opt/lanman/bin/net*
asx	Link to */var/opt/lanman/bin/asx*
dos2unix	Link to */var/opt/lanman/bin/dos2unix*
euctosjis	Link to */var/opt/lanman/bin/euctosjis*
findbrow	Link to */var/opt/nbrfc/bin/findbrow*
lmpaths	Link to */var/opt/lanman/bin/lmpaths*
lmshell	Link to */var/opt/lanman/bin/lmshell*
lmx	Link to */var/opt/lanman/bin/lmx*
midl	Link to */var/opt/lanman/bin/midl*
nbrfc	Link to */var/opt/nbrfc/bin/nbrfc*
nbrfcdiag	Link to */var/opt/nbrfc/bin/nbrfcdiag*
nbtstat	Link to */var/opt/nbrfc/bin/nbtstat*
net	Link to */var/opt/lanman/bin/net*
sjistoeuc	Link to */var/opt/lanman/bin/sjistoeuc*
ud	Link to */var/opt/lanman/bin/ud*
unix2dos	Link to */var/opt/lanman/bin/unix2dos*
uuidgen	Link to */var/opt/lanman/bin/uuidgen*
wins	Link to */var/opt/lanman/bin/wins*

Path: /usr/include/	Comment
lmx	Link to */var/opt/lanman/include*
sys/nbrfc.h	Include file for NetBIOS driver

Path: /usr/lib/	Comment
libasu437.so	Link to */var/opt/lanman/lib/libasu437.so*
libasu850.so	Link to */var/opt/lanman/lib/libasu850.so*
libasulang.so	Link to */var/opt/lanman/lib/libasulang.so*
libasusec.so	Link to */var/opt/lanman/lib/libasusec.so*
libasusjis.so	Link to */var/opt/lanman/lib/libasusjis.so*
liblmx.so	Link to */var/opt/lanman/lib/liblmx.so*
liblmxpsi.so	Link to */var/opt/lanman/lib/liblmxpsi.so*
libmsrpc.so	Link to */var/opt/lanman/lib/libmsrpc.so*
libnbdns.so	Link to */var/opt/nbrfc/lib/libnbdns.so*
librpcapi.so	Link to */var/opt/lanman/lib/librpcapi.so*
libsam.so	Link to */var/opt/lanman/lib/libsam.so*
libtask.so	Link to */var/opt/lanman/lib/libtask.so*
msrpc/ip_tcp.so	Link to */var/opt/lanman/lib/msrpc/ip_tcp.so*
msrpc/np.so	Link to */var/opt/lanman/lib/msrpc/np.so*
snmpd/lib/lmxext.so	From *asxsnmp* package: Advanced Server for UNIX extension
snmpd/mibs/lmxext.mib	From *asxsnmp* package: MIB

Path: /usr/share/	Comment
man/mrd/catman/asx/	From *asxman* package: manual pages for commands and API functions

Path: /var/opt/	Comment
prntfault	Internal shell script for internal LP error messages

Path: /var/opt/lanman/	Comment
clipr/	Directory for shared client printer
customs/	Preprocessor scripts
debug/	For *asxdebug* package
domains/	Directory with Advanced Server for UNIX account database
include/	Directory with Advanced Server for UNIX include files
lanman.ini	Advanced Server for UNIX configuration file
lanman.old	Saved *lanman.ini* from upgrade installation
mailslot/	Directory for mailslots
msgfiles/	Directory for internationalized message texts
readme	Description of current changes for Support Center
regfiles/	Directory for registry files
samsave/	Directory for saved SAM database files
sharefile.old	Saved list of shared resources from upgrade installation
spool/	Spool directory
timex/	Directory for internal use
wins/	Directory for WINS database

Path: /var/opt/lanman/addon/	Comment
psaddon/lp_ops.so	ATTHPI interface to AT&T Spool
psaddon/xpr_ops.so	SPOOLV4 interface to Spool V4.x

Path: /var/opt/lanman/bin/	Comment
acladm	ACL database administration
addclipr	Command for creating a client printer
asuconfig	Internally used for server configuration
asx	Script for starting and stopping the server

Path: /var/opt/lanman/bin/	Comment
blobadm	Internal command for database administration
chacl	ACL database administration
chdomain	Administration of users and groups
chgroup	Modifies a group
chuser	Modifies a user account
delclipr	Command for deleting a client printer
delshmem	Deletes the Shared Memory before starting the server
domainsids	Command for displaying "account SIDs"
dos2unix	MS-DOS -> UNIX conversion program
elfread	Command for displaying all log files
euctosjis	Program for file conversion to SJIS
fixdb	Used internally by the configuration scripts
fixmemsrv	Used internally by the configuration scripts
getrole	Outputs information on domains and server roles
jobdonmsg	Sends messages about print jobs to workstations
joindomain	Administrator command for changing the server domain configuration
lmat	Starts a program on the server at a particular time
lmecho	Program with the functionality of *net helpmsg*
lmpaths	Script for setting internal environment variables
lmshare	Program with the functionality of *net share*
lmshell	Shell to other servers, *net use* command
lmstat	Program with the functionality of *net status*
lmx	Link to */var/opt/lanman/bin/asx*
lmx.ctrl	Control process
lmx.ep	Endpoint mapper for RPCs
lmx.srv	Server for sessions
lmxstart	Prepares the server start
lmxsvc	Start script for programs under */var/opt/lanman/service*
lmxupgrade	Update of the user accounts and access rights of LAN Manager/X 2.0 and 2.2

Path: /var/opt/lanman/bin/	Comment
lsacl	Outputs ACL information
makemach	Used internally by the installation script
mapuname	Mapping of Advanced Server for UNIX users to UNIX users
midl	Microsoft Interface Definition Language Compiler for UNIX
mpact_chk	Not used by Siemens Advanced Server for UNIX
net	Advanced Server for UNIX command interface
netevent	Sends alerts
pralerter	Sends print alerts
promote	Changes the role of a domain controller
regadm	Administration program for registry (internally used)
regcheck	Program for registry checks and repairs
regconfig	Displays and modifies registry parameters
regload	Administration script for registry (internally used)
regpreload	Internal script for registry administration
regshare	Internally used for upgrade installation
regupgrade	Administration script for registry (internally used)
rmacl	Deletes ACL information
samcheck	Checks and repairs the user account database
seprimary	Used internally by the configuration scripts
setdomain	Internal program for setdomainname
setdomainlang	Sets the server's domain language
setdomainname	Sets the server's domain name
setlang	Sets the server's language
setlpcyc	Script for AT&T Spooler interface
setservername	Sets the server name
setspooler	Sets the server's Spooler interface
sjistoeuc	Program for file conversion to EUC
srvconfig	Processes the *lanman.ini* file
srvstat	Program for server status
startsvc	Start program for the service programs

Path: /var/opt/lanman/bin/	Comment
ud	UNIX <-> MS-DOS conversion program
unix2dos	UNIX -> MS-DOS conversion program
userrights	Displays and modifies user rights
uuidgen	RPC-UUID generator for UNIX
wins	Script for starting and stopping the WINS service
winsadm	Administration of WINS database
xprcl	Administration program for Spool 4.x interface
xprpr	Administration program for Spool 4.x interface
xprrun	Administration script for Spool 4.x interface
xprwait	Administration script for Spool 4.x interface

Path: /var/opt/lanman/datafiles/	Comment: Directory with Advanced Server for UNIX data
accounts.lm2	Backup of the LAN Manager/X 2.x database
accounts.lmx	LAN Manager/X 2.x database, not used by Advanced Server for UNIX
acl	ACL database of Advanced Server for UNIX (access control list)
Builtin	Account database of Advanced Server for UNIX with builtin accounts
chglog.lmx	Log of account changes
lsa	Advanced Server for UNIX account information
<name>.<no>	External database record, never touch!
prototype	Package description
registry	Advanced Server for UNIX registry information

Path: /var/opt/lanman/etc/	Comment: Directory for additional Siemens files
accadm	Administration program for saved permissions
accadm.dat	Created by *accget*
accget	Administration program for saving permissions
addserver	Temporarily adds another servername
asxcheck	Tool for checking installation / configuration of AS/X and NetBIOS
asxdemover	Reduces a full version to a 2-user demo version
asxinfo	Tool, for collecting information of the installation
asxperf	For AS/X diagnostics
asxpwexp	Sends a UNIX mail about AS/X passwords that are due to expire
asxpwexp.sam	Example of *asxpwexp.usr*
asxpwexp.usr	Configuration file for *asxpwexp*
asxregview	Command for displaying registry values
asxsetup	Program for changing the server configuration
asxupgrade	Upgrade a 2-user demo version to a full version
delserver	Deletes a servername added with *addserver*
liblmxco.so	Internal shared library
liblmxsup.so	Internal shared library
libXpCLI.so.2	Internal shared library for systems with no Spool V4 installation
libXpNET.so.2	Internal shared library for systems with no Spool V4 installation
lmfile	Command for displaying information on open files
mapnames	Creates a script that converts LM/X umlauts to AS/X umlauts in file and directory names for all resources
mapnames.sh	Shell script created by *mapnames*
printadm	Command for printer driver administration
rclmx	Advanced Server for UNIX environment variables, copy of */etc/rclmx*
repladm	Administration command for the replicator service

Path: /var/opt/lanman/etc/	Comment: Directory for additional Siemens files
userget	Administration program for saving users and groups

Path: /var/opt/lanman/init.d/	Comment
asx	Link to */var/opt/lanman/bin/asx*
asx_name	Only required if pre-installed at factory
asx_srv	Start/stop script for the server
asx_wins	Start/stop script for the WINS service
ms_srv	Start/stop script for the server

Path: /var/opt/lanman/lib/	Comment
libasu437.so	Library with functions for code conversion
libasu850.so	Library with functions for code conversion
libasulang.so	Library with functions for code conversion
libasusec.so	Library with security functions
libasusjis.so	Library with functions for code conversion
liblmx.so	Library with Advanced Server for UNIX functions
liblmxpsi.so	Library with internal interface to the Spool system
libmsrpc.so	Library with internal interface for RPC
librpcapi.so	Library with RPC-API functions
libsam.so	Library with database functions
libtask.so	Library with task functions
msrpc/ip_tcp.so	Library with RPC functions
msrpc/np.so	Library with RPC functions

Path: /var/opt/lanman/logs/	Comment
appevent.evt	File with application error messages
lmxstart.log	Logfile from server start
secevent.evt	File with monitoring information
sysevent.evt	File with server error messages

Path: /var/opt/lanman/service/	Comment: Directory with services
lmx.alerter	Program for the Alerter service
lmx.browser	Program for the Browser service
lmx.dmn	Daemon process for Netlogon service
lmx.extd	SNMP daemon program (in the *asxsnmp* package)
lmx.netrun	Program for the Netrun service
lmx.nvalert	Program for the Net-View Alerter service (not supported by Siemens Advanced Server for UNIX)
lmx.repl	Program for the Replication service
lmx.wins	Program for the WINS service

Path: /var/opt/lanman/shares/	Comment: Automatically shared directories
asu/repl/	Directory for the Replication service
asu/repl/export/	Export directory for the Replication service
asu/repl/export/scripts/	Export server: Directory with logon scripts
asu/repl/import/	Import directory for the Replication service
asu/system32/	Directory for message dll's and printer drivers
dos/	Directory with MS-DOS files/programs
lib/	Directory with libraries and header files for MS-DOS and OS/2
os2/	Directory with OS/2 files/programs
printlog/	Directory for the Printer service

Path: /var/opt/nbrfc/	Comment
addname	Link to */var/opt/nbrfc/bin/addname*
cr_config	Compatible with previous version
delname	Link to */var/opt/nbrfc/bin/delname*
get_config	Link to */var/opt/nbrfc/bin/get_config*
readme	Description of changes for the Support Center

Path: /var/opt/nbrfc/bin/	Comment
.nbrfc_autoconfig	Optional, only required if pre-installed at factory
add_interfaces32	Internal utility for loading the network interface (32-bit)
add_interfaces64	Internal utility for loading the network interface (64-bit)
add_interfaces	Equivalent to add_interfaces32 or add_interfaces64, depending on the system
add_names	Internal utility for loading the name table
addname	Loads static NetBIOS names
addwins	Internal utility for loading the WINS addresses
cr_interfaces	Creates the *interfaces.cfg* configuration file
del_names	Deletes the name table in the driver
delname	Deletes static NetBIOS names in the driver
delwins	Internal utility for deleting the WINS addresses
findbrow	Utility to find the master browser
get_config	Check program for configuration files
mv_names	Creates a new *names.cfg* file from an old *nbrfc.cfg*
names2lm	Converts *names.cfg* to lmhosts format
nbconfig	Displays and controls the interfaces
nbrfc	Link to */etc/init.d/nbrfc*
nbrfcdaemon	NetBIOS-RFC daemon
nbrfcdiag32	Diagnostic program for NetBIOS (32-bit)
nbrfcdiag64	Diagnostic program for NetBIOS (64-bit)

Path: /var/opt/nbrfc/bin/	Comment
nbrfcdiag	Equivalent to nbrfcdiag32 or nbrfcdiag64, depending on the system
nbtstat32	NetBIOS status display (32-bit)
nbtstat64	NetBIOS status display (64-bit)
nbtstat	Equivalent to nbtstat32 or nbtstat64, depending on the system

Path: /var/opt/nbrfc/conf/	Comment
interfaces.cfg	Configuration of the NetBIOS network interface
names.cfg	Configuration of the NetBIOS name table
names.sam	Sample file for *names.cfg*
nbrfcdaemon.cfg	Configuration of the NetBIOS daemon startup
wins.cfg	Configuration of WINS servers
wins.sam	Sample file for *wins.cfg*

Path: /var/opt/nbrfc/lib/	Comment
libnbdns.so	Library with functions for the DNS WINS integration

13 Advanced Server Registry

In Advanced Server, most configuration information is centrally stored in a single database called the *Registry*. The Advanced Server Registry largely replaces the *lanman.ini* configuration file which is used in LAN Manager for UNIX Systems and earlier versions of Advanced Server.

This chapter provides the following information:

- Overview of the Advanced Server Registry structure.

- Description of Registry Editor.

- Description of AS/U Administrator.

- Descriptions of the Advanced Server Registry keys and values.

For information about the Advanced Server parameters that are stored in the *lanman.ini* file and how *lanman.ini* file parameters are mapped to Advanced Server Registry keys, see chapter "Lanman.ini File".

13.1   Advanced Server Registry Structure

The Advanced Server Registry is a database organized in an hierarchical structure. It is composed of subtrees and their *keys*, and value entries. A key also can contain additional *subkeys.*

The following table identifies and defines the Advanced Server Registry subtrees.

Root key name	Description
HKEY_LOCAL_MACHINE	Contains information about the local computer system, including hardware and operating system data such as bus type, system memory, device drivers, and startup control data.
HKEY_USERS	Contains all actively loaded user profiles and the default profile. Users who are accessing a server remotely do not have profiles under this key on the server; their profiles are loaded into the registry on their own computers.

The Advanced Server Registry is stored in the */var/opt/lanman/datafiles* directory on the Advanced Server computer.

13.1.1   Value Entries in the Registry Keys

Each registry key can contain data items called *value entries.* Keys are analogous to directories, and value entries are analogous to files.

A value entry has three parts: the name of the value, the data type of the value, and the value itself, which can be data of any length. The three parts of value entries always appear in the following order.

```
          Name              Data type            Value

DependOnService: REG_MULTI_SZ: Tcpip Nbtsys Streams
```

Data types, such as REG_SZ or REG_EXPAND_SZ, describe the format of the data which can be up to 1 MB. Data types from 0 to 0x7fffffff are reserved for definition by the system, and applications are encouraged to use these types. Data types from 0x80000000 to 0xffffffff are reserved for use by applications.

The following table lists and defines the data types currently used by the system.

Data type	Description
REG_BINARY	Binary data. For example:
	`Component Information : REG_BINARY : 00 00 00...`
REG_DWORD	Data represented by a number that is 4 bytes long. Many keys for device drivers and services are this type and can be displayed in Registry Editor in binary, hexadecimal, or decimal format. For example, entries for service error controls are this type:
	`ErrorControl : REG_DWORD : 0x1`
REG_EXPAND_SZ	An expandable data string, which is text that contains a variable to be replaced when called by an application. For example, for the following value, the string *%SystemRoot%* will be replaced by the actual location of the directory containing the Advanced Server system files:
	`File : REG_EXPAND_SZ : %SystemRoot%\file.exe`
REG_MULTI_SZ	A multiple string. Values that contain lists or multiple values in human readable text are usually this type. Entries are separated by NULL characters.
	`AlertNames : REG_MULTI_SZ : Administrator tom`
REG_SZ	A sequence of characters representing human readable text. For example, a component's description is usually this type:
	`DisplayName : REG_SZ : Alerter`

13.2   **Using Registry Editor**

You can use the Registry Editor to view registry entries for the various components in Advanced Server. You can also use Registry Editor to modify or add registry entries.

The Registry Editor application, Regedt32.exe, does not appear in any default folders. It is installed automatically in the *%SystemRoot%\system32* folder on Windows NT systems. Click Run on the Start menu or switch to a command prompt and type **regedt32**.

13.2.1   **Connecting to a Remote Registry**

To edit the Advanced Server Registry using the Windows NT Registry Editor, you must connect to Advanced Server from the Registry Editor of a remote Windows NT computer. To do so, use the **Select Computer** command in the Registry menu of the Registry Editor.

Connecting to the Advanced Server Registry remotely will result in the display of the HKEY_USERS and HKEY_LOCAL_MACHINE subtrees.

For more information about connecting to a remote registry, see "Accessing the Registry of a Remote Computer" in Registry Editor Help.

> **i**   Using the Windows 95/98 Registry Editor to edit the Advanced Server Registry remotely is *not* recommended.

13.2.2   Viewing the Registry

Registry Editor displays the subtrees of the Registry. The hierarchical structure that appears in Registry Editor is similar to the hierarchical directory structures of Windows NT Explorer.
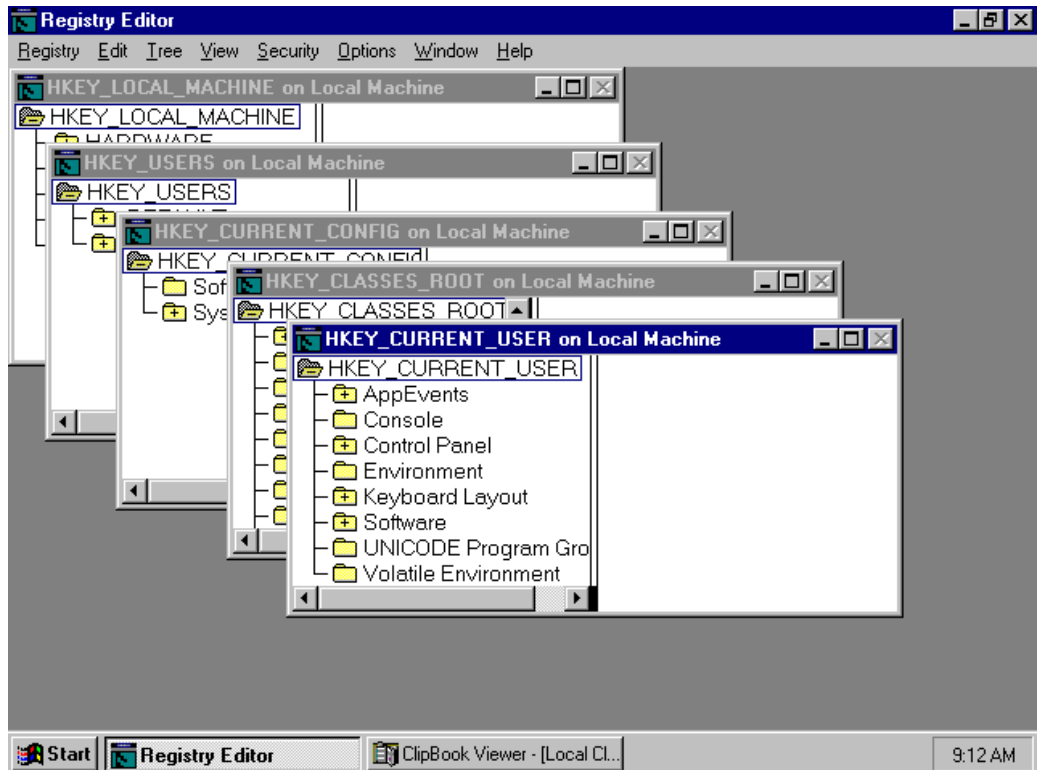
Your ability to make changes to the registry using Registry Editor depends on your access permissions. Generally, you can make the same kinds of changes using Registry Editor as your permissions allow for other administrative tools.

13.2.2.1   Registry Editor Commands

As shown in the following figure, Registry Editor displays data in two panes. The value entries in the right pane are associated with the selected key in the left pane.

Root of subtree

Hive

Aktive key

Subkeys

A value entry in the aktive key
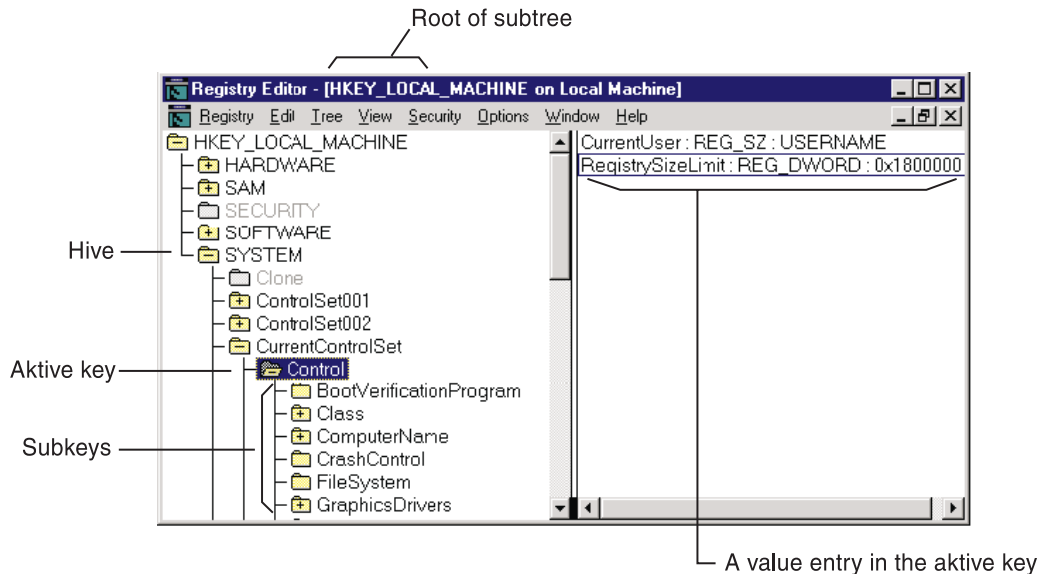
You can use the mouse or commands to manipulate the windows and panes in the Registry Editor in the same way as in the Windows NT Explorer. For example:

●   Double-click a key name to expand or collapse an entry. Or click commands from the View and Tree menus to control the display of a selected key and its data.

●   Use the mouse or arrow keys to move the vertical split bar in each window to control the size of the left and right panes.

●   Click **Tile** or **Cascade** from the Window menu to arrange the Registry Editor windows.

●   Click **Auto Refresh** from the Options menu to update the display continuously. You can also click one of the **Refresh** commands from the View menu to update the display of registry information when **Auto Refresh** is turned off.

The following table shows some keyboard methods for managing the display of data in each Registry Editor window.

Procedure	Keyboard action
Expand one level of a selected registry key.	Press ENTER.
Expand all of the levels of the predefined handle in the active Registry window.	Press CTRL + *.
Expand a branch of a selected registry key.	Press the asterisk (*) key on the numeric keypad.
Collapse a branch of a selected registry key.	Press ENTER or (-) on the numeric keypad.

13.3 Using AS/U Administrator

You can modify many of the values in the Advanced Server Registry using the AS/U Administrator. Using this tool allows you to modify specific keys in the registry which govern the performance of Advanced Server. Using AS/U Administrator (unlike the Registry Editor) allows you to choose from among lists of allowable values for each key. In this way, you are less likely to accidentally corrupt the data in your registry file.

AS/U Administrator is included in the Administrative Tools Package. This optional package must be installed on a server as described in "Installing Advanced Server for UNIX" in section "Installing the asxtools and asxtoolsD packages". Then you must install it on a Windows NT Workstation (Versions 3.51 or 4.0) computer serving as administrative network client, as described in chapter "Installing Network and Administrative Client Software" in section "Installing AS/U Administrator (AS/X Administration Tool)".

To start AS/U Administrator, click on its icon or execute the **Run** command in the Windows NT Start menu. In the **Select Computer** field, enter the name of the Advanced Server whose registry file you wish to configure. Configuration data for the selected computer will be displayed on the AS/U Administrator **Version** tab. To view or change Advanced Server Registry values, click on the **Policy** tab.

> **i** The AS/X administration program **asuadm** (AS/U Administrator) is only available in englisch.

The following table lists the policies and their associated Advanced Server Registry keys that can be modified using AS/U Administrator.

Policy	Advanced Server Registry Key
Alerter Service	(SYSTEM\CurrentControlSet\Services\Alerter\Parameters) IncludeMessageHeader CountNotOnNetworkCache NotOnNetworkCacheTimeout
Computer Browser Service	(SYSTEM\CurrentControlSet\Services\Browser\Parameters) MasterUpdate BackupUpdate BackupRecovery MoreLog
Connected Clients	(SYSTEM\CurrentControlSet\Services\Netlogon\Parameters) LogonQuery QueryDelay RelogonDelay (SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters) AutoDisconnect
File Name Space Mapping	(SYSTEM\CurrentControlSet\Services\AdvancedServer\ FileServiceParameters) NameSpaceMapping UniqueSuffixLength MixedCaseSupport TruncatedExtensions MappingSeparator
Netlogon Service	(SYSTEM\CurrentControlSet\Services\Netlogon\Parameters) Scripts Pulse (PDC only) Update (BDC only) Randomize (BDC only) SSIPasswdAge (BDC only)
Server Announcement	(SYSTEM\CurrentControlSet\Services\LanmanServer\ Parameters) Hidden SrvAnnounce LmAnnounce

UNIX Account Mapping	(SYSTEM\CurrentControlSet\Services\AdvancedServer\ FileServiceParameters)
	CreateUnixUser
UNIX File System Integration	(SYSTEM\CurrentControlSet\Services\Advanced Server\ FileServiceParameters)
	IgnoreUnixPermissions
	UnixDirectoryCheck
	UnixFilePerms
	UnixDirectoryPerms
	UseUnixLocks
	RootOwnsFilesCreatedOnNFS
UPS Service	(SYSTEM\CurrentControlSet\Services\UPS\Parameters)
	IgnoreSIGPWR
	PowerFailAddress
	PowerFailMessage
	PowerMessageInterval
Users Alerts	(SYSTEM\CurrentControlSet\Services\AdvancedServer\ AlertParameters)
	AlertAdminOnLicenseOverFlow
	AlertUserOnLicenseOverFlow
	(SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters)
	AccessAlert
	ErrorAlert
	LogonAlert

13.4 Registry Keys and Values

This section describes the Advanced Server Registry keys that are changed during administration. You may want to modify these values directly using the AS/U Administrator or a registry editor. You do not need to be concerned with every key in the Advanced Server Registry; only those keys that you may have reason to change are described.

The Advanced Server Registry keys described in this section are defined in subkeys located in the following path:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
      \AdvancedServer
      \Alerter
      \Browser
      \EventLog
      \LanmanServer
      \LanmanWorkstation
      \Netlogon
      \Netrun
      \Replicator
      \UPS
      \WINS
```

> **i** The server must be stopped and then restarted in order for most changes to the Advanced Server Registry to take effect.

The following parameters take effect as soon as they are changed:

Registry Path:

```
SYSTEM\CurrentControlSet\Services\AdvancedServer\FileServiceParameters
      \MappingSeparator
      \IgnoreUnixPermissions
```

Registry Path:

```
SYSTEM\CurrentControlSet\Services\Alerter\Parameters
      \AlertNames
      \IncludeMessageHeader
```

Registry Path:

```
SYSTEM\CurrentControlSet\Services\Browser\Parameters
      \BackupUpdate
      \MasterUpdate
      \BackupRecovery
      \MoreLog
```

Registry Path:

```
(where <logfile> is System, Application or Security)
SYSTEM\CurrentControlSet\Services\EventLog\<logfile>
      \MaxSize
      \Retention
```

Registry Path:

```
SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters
      \SrvComment
      \SrvAnnounce
      \Hidden
```

Registry Path:

```
SYSTEM\CurrentControlSet\Services\Netlogon\Parameters
      \Pulse
```

Registry Path:

```
SYSTEM\CurrentControlSet\Services\Replicator\Parameters
      \ExportList
      \ExportPath
      \GuardTime
      \ImportList
      \ImportPath
      \Interval
      \Pulse
      \Replicate
      \UnixDirectoryGroup
      \UnixDirectoryOwner
      \UnixFileGroup
      \UnixFileOwner
```

13.5   Advanced Server Key Descriptions

The Advanced Server subkey of the Advanced Server Registry contains the following subkeys:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\AdvancedServer
     \AlertParameters
     \FileServiceParameters
     \NetAdminParameters
     \Parameters
     \ProcessParameters
     \RpcParameters
     \ShareParameters
     \UserServiceParameters
```

The following sections describe the entries contained within those subkeys.

13.5.1   Alert Parameters Entries

The Registry path that contains entries for the Advanced Server Alerter service is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
     \AdvancedServer\AlertParameters
```

AlertAdminOnLicenseOverflow   REG_DWORD   *0 or 1*

Specifies whether the server sends an administrative alert message when the maximum allowable number of clients is exceeded.

Default: 0 (message will not be sent)

You can change the value of this key using the AS/U Administrator.

AlertUserOnLicenseOverflow   REG_DWORD   *0 or 1*

Specifies whether the server sends a message to a client that tried to link but failed when the maximum allowable number of clients was exceeded.

Default: 0 (message will not be sent)

You can change the value of this key using the AS/U Administrator.

ConnectTimeout   **REG_DWORD**   *0 - infinity*

Sets the maximum time in seconds for blocking by the Alerter service if a name to which an alert is to be sent can be found, i.e. resolved, but the computer is not available.

This setting is also used by the Browser service, if lists of remote computers are requested whose names can be found, i.e. resolved, but the computers are not available.

Default: 10

13.5.2 File Service Parameters Entries

The Registry path that contains entries for the Advanced Server file service is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
      \AdvancedServer\FileServiceParameters
```

AclCacheSize   **REG_DWORD**   *0 - 100*

Specifies the number of entries in ACL cache which keeps track of the results or recent access checks performed on Advanced Server resources.

Default: 6

EAFilePrefix   **REG_SZ**   *Character string*

Prefix used to name files containing extended attribute data. For example, by default, the extended attributes for file *foo* are stored in .EA@foo.

Default: .EA@

EnableSoftCompat   **REG_DWORD**   *0, 1, or 2*

Specifies how Advanced Server handles file opens in read-only compatibility mode. Use 0 to keep the compatibility mode; 1 to translate to read-only/DenyWrite mode for files with special extensions (for example, .EXE, .COM, and .BAT) specified by the value of the EnableSoftFileExtensions key; and 2 to translate to read-only/DenyWrite mode for all file opens.

Default:

> 1 - for AS/X V4.0A0 (translate files with special extensions to read-only/DenyWrite)

> 2 - for AS/X since V4.0A10 (translate to read-only/DenyWrite mode for all file opens)

EnableSoftFileExtensions   REG_MULTI_SZ   *List*

Specifies the file extensions for which the compatibility mode will be translated to read-only/DenyWrite if the value of the EnableSoftCompat key is set to 1.

Default: bat com exe dll cmd

ForceDirectoryAcl   REG_DWORD   *0 or 1*

Determines whether Advanced Server will create an access control list for a newly-created directory if an explicit access control list was not provided by the client computer. If an access control list is not created, one will be inherited automatically from its parent directory whenever it is needed.

Default: 1 (create new access control list)

ForceFileAcl   REG_DWORD   *0 or 1*

Determines whether the Advanced Server will create an access control list for a newly-created file if an explicit access control list was not provided by the client computer. If an access control list is not created, one will be inherited automatically from its parent directory whenever it is needed.

Default: 0 (will not create new access control list)

ForceFileFlush   REG_DWORD   *0 or 1*

Specifies whether to force a UNIX fsync(2) system call when an SMB flush request is received. Not forcing fsync(2) system calls can improve file server performance; files will be flushed automatically to disk by the UNIX *fsflush* daemon periodically, regardless of the setting of this key.

Default: 0 (will not force fsync system call)

IgnoreUnixPermissions   REG_DWORD   *0 or 1*

Gives users the option to bypass UNIX system permissions when working with files and directories. For example, enabling this option would allow Advanced Server users to write to or delete files for which they have sufficient Advanced Server permissions even though only UNIX system read permissions had been granted to those files.

Default: 0 (enforce UNIX system permissions)

You can change the value of this key using the AS/U Administrator.

⚠ The parameters UnixQuotas, IgnoreUnixPermissions and UnixDirectoryCheck depend on each other in the following way:

– If UnixQuotas is set to 1, the other two parameters are both assumed to be 0 independent of their real registry values.

– If UnixQuotas is set to 0 and IgnoreUnixPermissions is set to 1, the parameter UnixDirectoryCheck is assumed to be 2 independent of its real registry value.

MappingSeparator   REG_SZ   *Character string up to 7 characters*

Specifies the string that will be appended to the file name before its unique suffix to indicate that the name is mapped. This value matters only in UNIX system to Windows NT file name mapping. The default is a tilde (~), the same as in UNIX system to 8.3 mapping, but it is possible to set it to enable the client to easily identify files containing characters illegal in Windows NT. By default, a file named "my?" will be mapped to "my_~xyz". When the value of this key is set to "~asu~", the name will be mapped to "my_~asu~xyz". If an invalid parameter is placed in the Registry, the MappingSeparator will be replaced by the default value.

Default: ~

You can change the value of this key using the AS/U Administrator.

MaxEASize   REG_DWORD   *1 - infinity*

Specifies the buffer size in bytes that is allocated for extended attributes.

Default: 4096

MaxFileSizeInKB   REG_DWORD   *100 - infinity*

The maximum file size, in KBytes, that Advanced Server will allow a user to create on the server.

Default: 100000

MaxZeroFillInKB   REG_DWORD   *0 - infinity*

MaxZeroFillInKB controls the amount of space in KB that is zero filled when a client performs a zero length write. NT clients use zero length writes to pre-allocate disk space when copying files. On UNIX, disk space is not allocated to an extended file unless it is physicall written to.
Advanced Server has to write physically to the disk and this takes time within one SMB request. Some clients might get a timeout while Advanced Server is allocating the disk space. If a very large file is copied from an NT client to an Advanced Server share and the file sizes exceeds MaxZeroFillInKB, all of the disk space for that big file will not be allocated on the Advanced Server machine.

Default: 50000 (50 MB)

MemoryMapFiles   REG_DWORD   *0 or 1*

Specifies whether the server uses the UNIX system *mmap* system call to memory map file data into the server's address space for efficiency. File mapping is attempted only for read-only files.

Default: 1 (memory map read-only files)

MixedCaseSupport   REG_DWORD   *0 or 1*

Specifies whether mixed-case support is enabled on the server. Mixed-case support allows clients to access file names containing uppercase characters on the UNIX system. Enabling mixed-case support may negatively affect the server's performance.

Default: 0 (make all file names lowercase)

You can change the value of this key using the AS/U Administrator.

NameSpaceMapping   REG_DWORD   *0, 1, 2, or 3*

Specifies the type of file name space mapping enabled on the server.

A value of 0 indicates that there is no name space mapping enabled.

A value of 1 specifies that only UNIX system to 8.3 mapping is enabled. This allows 8.3-style clients, such as MS-DOS, Windows 3.1, and Windows for Workgroups, to access files with long file names and file names containing characters that are invalid in DOS (+ , ; = [ ] ? " \ < > * | : . [space])

A value of 2 specifies that only UNIX system to Windows NT mapping is enabled. This allows Windows NT-style clients, such as Windows 95/98, Windows NT, and OS/2, to access files with file names containing characters that are illegal in Windows NT (? " \ < > * | :).

A value of 3 specifies that both UNIX system to 8.3 and UNIX system to Windows NT mappings are enabled.

Default: 3

You can change the value of this key using the AS/U Administrator.

NfsCheck   REG_DWORD   *0 or 1*

Specifies whether to check if this is an NFS file system before setting record locks.

Default: 0 (no check)

OplockTimeout   REG_DWORD   *1 - infinity*

The interval of time (in seconds) that the server waits for acknowledgment from a client of an "oplock" broken notification.

Default: 30

ReadAheadCount   REG_DWORD   *0 (always read ahead) - infinity*

The number of sequential file accesses by a client that the server must detect before it begins reading ahead.

Default: 2

ReportNTFS   REG_DWORD   *0 or 1*

Specifies whether to report share UNIX system volumes as NTFS or actual UNIX file system type.

Default: 1 (report as NTFS)

RootOwnsFilesCreatedOnNFS   REG_DWORD   *0 or 1*

Specifies whether files on NFS are owned by root or user.

Default: 1 (root owns files)

You can change the value of this key using the AS/U Administrator.

SyncAclFileOnWrite   REG_DWORD   *0 or 1*

Determines whether the server will force changes to the access control list (ACL) file to be written to disk using an fsync(2) system call or whether the server will permit the operating system to write the changes to disk normally.

Default: 0 (write ACL changes to disk normally)

TruncatedExtensions   REG_DWORD   *0 or 1*

Specifies whether to replace the last character of the file extension of a mapped file name with a tilde (~). This key applies to file extensions which originally were longer than 3 characters. This feature can be used to distinguished longer file extensions from similar 3-character extensions that were unchanged. For example, enabling this feature prevents a file named *file1.document* from being mapped to a file named *file~xyz.doc* which could cause some clients to consider this file a Microsoft Word file. (This key affects only UNIX system to 8.3 file mapping.)

Default: 1 (Do not replace last character with a tilde.)

You can change the value of this key using the AS/U Administrator.

UniqueSuffixLength   REG_DWORD   *0 to 7*

Specifies the length of the alpha-numeric suffix appended to the file name to guarantee the mapping uniqueness. The longer the suffix, the higher the probability that the mapped name is unique. If the mapped name is not unique within a directory, name collisions may occur. They may cause the client to be denied access to the file it needs, or the client may get access to a different file than the one it requested.

It is not advisable to set UniqueSuffixLength to a value less than 3, unless the preservation of a longer file name prefix outweighs possible name collision problems.

Default: 3

You can change the value of this key using the AS/U Administrator.

UnixCloseCount   REG_DWORD   *1 - 20*

The number of least-recently accessed open files that the server closes transparently to avoid reaching the UNIX system's per-process limit. The server uses a technique called file descriptor multiplexing to allow clients to open far more files than the per-process limits would normally allow.

Default: 5

UnixDirectoryCheck   REG_DWORD   *0, 1, or 2*

Specifies whether Advanced Server will allow clients to write to UNIX system directories that do not have write permissions. Microsoft client software treats the "Read-Only" attribute as advisory and does not limit the behavior of directories. In contrast, the UNIX system treats "Read-Only" permissions as mandatory and prohibits users from writing in directories for which they do not have write permission.

A value of 0 allows writing only to directories with write permissions; a value of 1 allows writing to directories belonging to or created by Advanced Server (as determined by checking group memberships of directory); and a value of 2 ignores UNIX system directory permissions.

Default: 1

You can change the value of this key using the AS/U Administrator.

The parameters UnixQuotas, IgnoreUnixPermissions and UnixDirectoryCheck depend on each other in the following way:

– If UnixQuotas is set to 1, the other two parameters are both assumed to be 0 independent of their real registry values.

– If UnixQuotas is set to 0 and IgnoreUnixPermissions is set to 1, the parameter UnixDirectoryCheck is assumed to be 2 independent of its real registry value.

UnixDirectoryPerms   REG_DWORD   *0 - 511*

The UNIX system permissions for newly-created directories.

Default: 509 (0775 octal)

You can change the value of this key using the AS/U Administrator.

UnixFilePerms   REG_DWORD   *0 - 4095*

The UNIX system permissions for newly-created files.

Default: 1460 (02664 octal)

You can change the value of this key using the AS/U Administrator.

UnixQuotas   REG_DWORD   *0 or 1*

> ℹ️ This parameter configures the restriction of disk space for "normal" UNIX users, both for UNIX disk quota functionality and for using reserved disk space.

Specifies whether writing to files is performed under the UNIX user ID (UID) of the UNIX system user to which the Advanced Server user is mapped.

Effects of the parameter on preserving the reserved disk area:

The files are written to under the UID of the relevant UNIX user. If this UID is not "0", it is not possible to write to the reserved disk space. The reserved disk space is then no longer counted when displaying the free disk space.

Effects of the parameter on UNIX disk quota functionality:

Specifies whether Advanced Server provides UNIX system disk quota support. This ensures that creating or writing to the file is performed under the UNIX system UID of the UNIX system user to which the Advanced Server user is mapped. Each action counts toward that user's quota; an error message is sent to the client when the quota is exceeded. Two quotas are supported: i-node and block quotas for UFS and NFS file systems. This is true to the extent of the ability of these file systems to support UNIX system quotas.

See also the chapter: "Restricting the user's disk space".

Default: 0 (no restriction of disk space)

> ⚠️ The parameters UnixQuotas, IgnoreUnixPermissions and UnixDirectoryCheck depend on each other in the following way:
>
> – If UnixQuotas is set to 1, the other two parameters are both assumed to be 0 independent of their real registry values.
>
> – If UnixQuotas is set to 0 and IgnoreUnixPermissions is set to 1, the parameter UnixDirectoryCheck is assumed to be 2 independent of its real registry value.

UseEAs   REG_DWORD   *0 or 1*

Specifies support for OS/2 extended attributes.

Default: 0 (no support for extended attributes)

UseNfsLocks   REG_DWORD   *0 or 1*

Specifies whether the server tries to set UNIX system record locks in files as requested by clients. Record locks may not work on NFS files on a server running NFS. If the value of the UseUnixLocks key is 0, this feature has no effect on the server.

Default: 0 (do not set locks)

UseOplocks   REG_DWORD   *0 or 1*

Specifies whether Advanced Server grants opportunistic locks to clients who request them on opens.

Default: 1 (use opportunistic locks)

UseUnixLocks   REG_DWORD   *0 - 2*

Determines how the Advanced Server for UNIX maps file and record locks to the UNIX file system.

0 : record locks created by clients are not executed in the UNIX file system

1 : record locks created by clients are also executed in the UNIX file system

2 : record locks created by clients are also executed in the UNIX file system and, in addition, files are opened in non-blocking mode

Default: 0

⚠️ If mandatory locking is used (i.e. the bit for mandatory locking is set in the UnixFilePerms parameter, e.g. to the default *rw-rwlr--*) in order to synchronize non-network enabled client applications with UNIX applications, the setting "2" prevents the server processes from hanging in the read() and/or write() system calls and thereby blocking other clients that operate on the same server process. Instead, the read/write client receives an appropriate error message.

The value of this key can be changed using AS/U Administrator, but only to the value 0 or 1.

VolumeLabel   REG_DWORD   *0 or 1*

Shows volume lable of physical volume. Especially useful for sharing CD-ROMs.

Default: 0 (show default label)

ℹ️ This functionality is not supported with the current version of AS/X V4.0.

WriteBehind   REG_DWORD   *0 or 1*

Specifies whether physical UNIX system writes are performed before or after the server responds to the client. If UNIX system writes are performed before the server responds to the client, then the server appears to be slower (because the response is delayed), but the server can report disk full errors to clients. If UNIX system writes are performed after the response is sent, disk full errors during write SMBs are not reported to the client.

Default: 1 (enable write behind)

13.5.3   Net Administration Parameters Entries

The Registry path that contains entries for the Advanced Server Net Administration is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
      \AdvancedServer\NetAdminParameters
```

NetAdminGroupName   REG_SZ   *Character string*

The UNIX system group name assigned to the *net admin \\servername /c* command.

Default: DOS----

NetAdminPath   REG_SZ   *Character string up to 256 characters*

The UNIX system path used to find commands submitted by the

net admin \\servername /c command.

Default: /var/opt/lanman/bin:/bin:/usr/bin

NetAdminUserName   REG_SZ   *Character string*

The UNIX system user account name assigned to a process executed by

net admin \\servername /c.

Default: lmxadmin

13.5.4 Parameters Entries

The Registry path that contains entries for the Advanced Server Parameters is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
        \AdvancedServer\Parameters
```

BigEndianLuidCompatibilityMode REG_DWORD *0 or 1*

This keyword only applies to to big-endian Advanced Server implementations like Siemens Advanced Server for RM systems. When the value of this keyword is set to 0, big-endian Advanced Server return security privilege information to the client only in INTEL byte order. If the value of this keyword is 1, then this information is returned in both INTEL and big-endian byte orders. Setting this parameter to 1 allows Windows NT Version 3.51 clients to administer big-endian Advanced Servers. Windows NT Version V4.0 or later clients can administer Advanced Server regardless of the setting of this keyword. The value of this keyword must be set to 0 in order to install Microsoft Exchange Server correctly on a Windows NT Version 4.0 Server that is a backup domain controller to a big-endian Advanced Server primary domain controller.

Default: 1

| **i** | Parameter is supported since Advanced Server for UNIX V4.0A10.

CallXpstatDev   REG_DWORD   *0 or 1*

Controls whether the device status of Spool V4.x is queried or not.

Querying the device status is more time consuming. The current print job on the device cannot be displayed with CallXpstatDev set to 0.

(Only applicable for Spool V4.x).

Default: 0 (no query)

CheckPrintQueueInMinutes   REG_DWORD   *1 - infinity*

The interval in minutes at which the server determines whether a printer queues should be started.

Default: 10 minutes

DeletedPrintJobTimeOnQ   REG_DWORD   *0 - infinity*

Specifies the time (in seconds) during which deleted print jobs will remain in the internal print job queue maintained by the lmx.srv process. This behavior can be disabled with the value 0, which means that the print job is not kept in the internal queue.
This setting avoids a problem printing from some versions of Microsoft Internet Explorer 4.0, which can lead to an NT client continuing to send RPC calls indefinitely because it could not access a print job that was already deleted.

This key is only evaluated if the AT&T Spooler ("ATTHPI" interface) is configured and the DisableUpLevelPrinting parameter is set to 0.

Default: 180 (3 minutes)

DisableUpLevelPrinting   REG_DWORD   *0 or 1*

Specifies whether to disable or enable Windows NT-style printing.

If you chose to disable Windows NT-style printing during an upgrade procedure, resulting in the setting of this value to 1, then you can enable this feature by changing this value to 0. See chapter "Installing Advanced Server for UNIX" for more information about Windows NT-style printing upgrade.

Default: 0

Locale   REG_SZ   *Character string*

Specifies which locale the Advanced Server will use to translate characters to and from upper- and lower-case letters.

Values: Any valid LC_CTYPE locale.

Default: De_DE.88591

MaxDirectoryBufferSize   REG_DWORD   *1 - infinity*

The maximum size of a buffer that the server will use for a getdents(2) system call to read the contents of a UNIX system directory. Because Advanced Server will attempt to allocate these buffers using the GC memory allocator, one should consider increasing the SizeGcBufferPoolInKB key if one increases this value.

Default: 32768 bytes

MaxIpcTryCount   REG_DWORD   *1 - infinity*

The number of read() system calls after which the server checks to see if other work could be done by the server. There is a considerable amount of interprocess communication (IPC) between server processes. The server uses the read system call to receive IPC messages, but read does not always return the entire message. This key ensures that the server does not keep trying to get an IPC message at the expense of other activities the process could perform.

Default: 20

MaxMailslotReadTime   REG_DWORD   *1 - infinity*

The amount of time in seconds to wait for a local mailslot application to read a class 1 mailslot. A value specified here keeps the server from waiting indefinitely for a message to be delivered.

Default: 90 seconds

MaxMessageSize   REG_DWORD   *1024 - 65535*

The maximum amount of data that a client can exchange with the server in one message.

Default: 65535 (bytes)

MaxPrintQueueNameLength   REG_DWORD   *1 - 255 characters*

Provides dynamic control of the allowable length of the name of a printer queue. LP subsystem commands currently allow class names to be as large as 255 characters, but jobs sent to these classes cannot be controlled and many of the UNIX system commands to manipulate these jobs result in a fatal error. This key is used by printer queue functions to restrict access to queues based on the length of the queue name.

Default: 14

MaxRawSize   REG_DWORD   *8192 - 65535 bytes*

Specifies the maximum size (in bytes) of the raw send or receive buffers that the Advanced Server will use for processing Read Block Raw, Write Block Raw, Transaction, Transaction 2, or NT Transaction SMBs.

Default: 32768

MaxServiceWaitTime   REG_DWORD   *5 seconds - infinity*

Specifies the amount of time (in seconds) the server will wait for a service to respond when it changes the following statuses of the services: pause, continue, install, uninstall.

Default: 60

NativeLM   REG_SZ   *Character string*

An additional field in the session setup request/response. This field is generated at run time.

Default: Advanced Server 4.0 for UNIX Systems

NativeOS   REG_SZ   *Character string*

An additional field in the session setup request/response. This field is generated at run time.

Default: (Platform-dependent)

SendByeMessage   REG_DWORD   *0 or 1*

Specifies whether the server sends a message to every client in the domain in the event that it is going to stop for any reason other than a normal shutdown. The message states that the Advanced Server has stopped.

Default: 1 (send a message)

SizeGcBufferPoolInKB   REG_DWORD   *1 - infinity*

The buffer size in KBytes allocated for each server process for client files.

Default: 200 (KBytes)

SpoolinAsUnixUser   REG_DWORD   *0 or 1*

The parameter is only evaluated if the configured spooler is "SPOOLV4".

If the parameter is set to 1, Advanced Server submits the print jobs to the spooler under the user ID of the relevant UNIX user who is mapped to the Advanced Server user. For example, the Advanced Server administrator submits print jobs as the UNIX user "lmxadmin". This setting allows several spool mechanisms to be better utilized, for example identifying a user via the banner page or assigning page quotas.

The setting 0 is compatible with Advanced Server versions 3.5 and 4.0A, the print jobs are transferred to the spooler under the user ID "root".

Default: 0 (spooling is performed under the user ID of "root")

13.5.5   Process Parameters Entries

The Registry path that contains entries for the Advanced Server Process Parameters is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
     \AdvancedServer\ProcessParameters
```

CoreOk   **REG_DWORD**   *0 or 1*

Specifies whether the server can create a core dump file on disastrous failures.

Default: 1 (create core file)

KeepSpareServer   **REG_DWORD**   *0 or 1*

Specifies whether the server should have a spare lmx.srv process available for another client. New client connections are likely to be quicker if this key is enabled.

Default: 1 (start lmx.srv process)

LockNapInMSec   **REG_DWORD**   *1 - infinity*

Specifies the length of time in milliseconds that the server sleeps when shared memory lock contention occurs. The server retries busy locks at intervals specified in this key until the length of time specified in the value of the MaxLockTimeInSeconds key elapses.

Default: 10 milliseconds

MaxLockTimeInSeconds   **REG_DWORD**   *5 - infinity*

The maximum interval in seconds that a server process waits for a shared memory lock to become available.

Default: 300 seconds (5 minutes)

MaxVCPerProc   **REG_DWORD**   *0 - 101*

The maximum number of virtual circuits that each lmx.srv process should be able to handle. This limit normally is calculated on the fly by Advanced Server using the value of the VCDistribution Registry key and the value of the maxclients parameter in the *lanman.ini* file. If the value of this key is non-zero, its value is used instead of the calculated value.

Default: 0 (Use value of VCDistribution key)

MaxVCs   REG_DWORD   *1 - infinity*

The maximum number of virtual circuits that can be established to an Advanced Server computer. This limit normally is calculated on the fly by Advanced Server using the value of the maxclients parameter in the *lanman.ini* file. This key permits administrators to manually override the sizing of shared memory. Do not change the value of this key.

Default: 1 (Compute maximum number of sessions from maxclients parameter)

MinSmbWorkerTasks   REG_DWORD   *0 - 100*

Determines how many SMBWORKER tasks are preallocated by lmx.srv processes on startup. Do not change the value of this key.

Default: 3

MinVCPerProc   REG_DWORD   *0 - infinity*

The minimum number of virtual circuits that each lmx.srv process should be able to handle. This limit normally is calculated on the fly by Advanced Server using the value of the VCDistribution Registry key and the value of the maxclients parameter in the *lanman.ini* file. If this value is non-zero, its value is used instead of the calculated value.

Default: 0 (Use value of VCDistribution key)

NumCIStructs   REG_DWORD   *0 - infinity*

Sizes the CLIENTINFO array in shared memory.

Do not change the value of this key.

Default: 12

NumCLIENT_SESSION   REG_DWORD   *5 - infinity*

Limits the number of trust relationships that a server can maintain with other domains. This figure should be at least one greater than the number of domains trusted by the server's domain.

Default: 5

NumHashTables   REG_DWORD   *8 - infinity (powers of 2)*

The number of buckets for the hash table in shared memory to keep track of the various modes that clients have used to open files and set record locks.

Do not change the value of this key.

Default: 128

NumSERVER_SESSION   REG_DWORD   *5 - infinity*

Limits the number of servers and Windows NT clients that can authenticate with the server. This figure should be large because it limits the number of Windows NT clients that can contact the server. On a primary domain controller, it must be at least the number of servers and Windows NT clients in the domain.

Default: 100

NumUStructs   REG_DWORD   *1 - infinity*

The number of structures allocated in shared memory to handle record lock and open file records. The sum of open files and record locks cannot exceed the value of this key.

Default: 1000

SpareServerTime   REG_DWORD   *0 - infinity*

The interval in seconds that a spare lmx.srv process is allowed to run without serving a client before being terminated.

Default: 120 seconds (2 minutes)

StopOnCore   REG_DWORD   *0 or 1*

Specifies whether the lmx.ctrl process is to stop if it finds that an lmx.srv process has terminated unexpectedly.

Default: 0 (do not stop Advanced Server)

TimeToDrop   REG_DWORD   *0 - infinity*

Instable clients can block a processs "lmx.srv" which then cannot answer any more to queries of the the process "lmx.ctrl". If the value of the parameter is greater than 0, then the process "lmx.srv" controls the read-write-operations of the clients with this timer. If the client is down or hanging then the process "lmx.srv" ends the connection with this client.

Clients which are only inactive will not be influenced. Please change the predefined values only if in the system log there is an entry "lmx.srv not responding for 180 seconds".

Default: 0 seconds

i | This functionality is not supported with the current version of Advanced Server for UNIX V4.0.

VCDistribution   REG_MULTI_SZ   *List*

Specifies the distribution of virtual circuits or sessions over lmx.srv processes. The architecture of the server allows multiple sessions to be served by each lmx.srv process on the UNIX system. The server must decide if a new session should be handed off to an existing lmx.srv process or if a new process should be started. This key specifies the distribution of sessions over the lmx.srv processes.

Values are entered in sets of three integers separated by commas, each set of three number on a new line. In each set, the first number specifies the number of clients; the second is the minimum number of virtual circuits each lmx.srv process should support; the third is the maximum number of virtual circuits each process should support.

Default: 1,2,12

20,2,20

35,2,24

50,3,28

85,4,28

100,5,32

130,6,36

180,8,42

250,9,44

350,10,50

500,10,60

750,10,80

1000,10,101

The following table describes the meaning of the default value:

Client Range	Minimum sessions per lmx.srv	Maximum sessions per lmx.srv
1-19	2	12
20-34	2	20
35-49	2	24
50-84	3	28
85-99	4	28
100-129	5	32
130-179	6	36
180-249	8	42
250-349	9	44
350-499	10	50
500-749	10	60
750-999	10	80
1000+	10	101

13.5.6 RPC Parameters Entries

The Registry path that contains entries for the Advanced Server RPC Parameters is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
      \AdvancedServer\RpcParameters
```

BrowserMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of open browser sessions that an lmx.srv process can support simultaneously.

Default: 20

EventlogMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of open event log sessions that an lmx.srv process can support simultaneously.

Default: 20

LsarpcMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of open LSA RPC sessions that an lmx.srv process can support simultaneously.

Default: 20

NetlogonMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of open Netlogon sessions that an lmx.srv process can support simultaneously.

Default: 20

SamrMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of SAM sessions that an lmx.srv process can support simultaneously.

Default: 20

SpoolssMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of print sessions that an lmx.srv process can support simultaneously.

Default: 50

SrvsvcMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of server sessions that an lmx.srv process can support simultaneously.

Default: 20

SvcctlMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of service control sessions that an lmx.srv process can support simultaneously.

Default: 20

WinregMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of Registry sessions that an lmx.srv process can support simultaneously.

Default: 20

WkssvcMaxCalls   REG_DWORD   *5 - infinity*

The maximum number of workstation sessions that an lmx.srv process can support simultaneously.

Default: 20

13.5.7   Share Parameters Entries

The Registry path that contains entries for the Advanced Server Share Parameters is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
      \AdvancedServer\ShareParameters
```

KeepAdministrativeShares   REG_DWORD   *0 or 1*

Specifies whether administrators are prevented from removing the ADMIN$ and IPC$ shared resources.

Default: 1 (prevented from removing shared resources)

MakeUnixDirectoriesOnShare   REG_DWORD   *0 or 1*

When creating a new share using Server Manager, specifies whether the Advanced Server should create a directory automatically if one does not exist.

Default: 1 (create new directory)

ShareReadCount   REG_DWORD   *1 - infinity*

The number of share entries to read during share list operations. Setting this value greater than 1 causes the server to read ahead SHAREENTRY structures from the Registry.

Default: 25

13.5.8   User Service Parameters Entries

The Registry path that contains entries for the Advanced Server User Service Parameters is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services
      \AdvancedServer\UserServiceParameters
```

CreateUnixUser   REG_DWORD   *0 or 1*

Automatically creates and assigns a similarly-named UNIX system user account to every new Advanced Server user account created in the domain in which the server is a member. The value of this key must be set to 1 on every server on which UNIX system accounts are to be created. Note that new Advanced Server users are assigned to the UNIX system *lmworld* account, if the value of this key is set to 0.

Default: 1 (create UNIX system user account)

You can change the value of this key using the AS/U Administrator.

Exclude   REG_SZ   *Character string*

Specifies existing UNIX system user IDs excluded from being assigned to Advanced
Server user accounts. If an Advanced Server user account is created whose name
matches an existing UNIX system user account whose ID is contained in the exclude
list, a new UNIX system user account will be generated automatically and assigned to
the Advanced Server user account. This can be used to ensure that certain existing
UNIX system user accounts never are assigned automatically to newly-created
Advanced Server user accounts, even if the ForceUniqueUnixUserAccount key is set
to 0.

Default: 0 - 100

ForceUniqueUnixUserAccount   REG_DWORD   *0 or 1*

Specifies whether to assign automatically an existing UNIX system user account to a
newly-created Advanced Server user account. If you select 1, then the system does not
assign existing UNIX system user accounts. Instead, new UNIX system user accounts
are generated automatically and assigned to Advanced Server user accounts when
they are created.

Default: 0 (A new Advanced Server user account can be assigned automatically to an
existing UNIX system user account with an equal or similar name, provided that the
UNIX system user account is not specified in the exclude list.)

GroupUpdateTime   REG_DWORD   *0 - infinity*

The interval in seconds at which the server checks the UNIX system file */etc/group* for
changes.

Default: 3600 seconds (1 hour)

NewUserShell   REG_SZ   *Character string*

The login shell for new user accounts. The default prevents new users from logging into
the UNIX system using a terminal emulator. To enable login, set this key to a real value,
such as */bin/sh*.

Default: /bin/false

SyncUnixHomeDirectory   REG_DWORD   *0 or 1*

Whenever the home directory of an Advanced Server user account changes, this key
changes the home directory of the associated UNIX system user account to match the
Advanced Server home directory.

Default: 0 (do not synchronize home directories)

UserComment   REG_SZ   *Character string*

The comment to assign to all automatically-created UNIX system user accounts.

Default: Advanced Server for UNIX user

UserRemark   REG_SZ   *0 to 48 characters*

The comment string associated with the USERS shared directory.

Default: Users Directory

13.6 Alerter Service Parameters

The Registry path that contains entries for the Advanced Server Alerter service is as follows:

`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Alerter\Parameters`

AlertNames   REG_MULTI_SZ   *List*

A list of the user accounts and computer names that should receive administrative alerts.

Default: None

CountNotOnNetworkCache   REG_DWORD   *0 - infinity*

Specifies the number of non-running cached clients to which the Alerter service should not send messages. When the Alerter service tries to send a popup message to a client, NetBIOS name resolution can cause unwanted delays if the client is not on the network. To circumvent this problem, the Alerter service caches the names of clients that are not running and does not send alerts to these clients.

Default: 10

You can change the value of this key using the AS/U Administrator.

IncludeMessageHeader   REG_DWORD   *0 or 1*

Specifies whether the Alerter service should add four lines of header information to messages (sender, recipient, subject, and date).

Default: 0 (do not include headers)

You can change the value of this key using the AS/U Administrator.

NotOnNetworkCacheTimeout   REG_DWORD   *0 - infinity*

Specifies how long in seconds that non-running clients should remain in the server's cache of clients.

Default: 120 seconds (2 minutes)

You can change the value of this key using the AS/U Administrator.

13.7 Browser Service Parameters

The Registry path that contains entries for the Advanced Server Computer Browser service is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Browser\Parameters
```

BackupRecovery   REG_DWORD   *60 - infinity*

Specifies the period of time in seconds that must elapse before a server that has ceased being a backup browser can become a backup browser again.

Default: 1800 seconds (30 minutes)

You can change the value of this key using the AS/U Administrator.

BackupUpdate   REG_DWORD   *60 - infinity*

Indicates the interval in seconds at which the backup browser refreshes its browse lists with the master browser.

Default: 720 seconds (12 minutes)

You can change the value of this key using the AS/U Administrator.

> **i** This parameter will influence network traffic between Backup Browsers and Master Browsers. Increasing the value may reduce the traffic e.g. in a WAN environment.

MasterUpdate   REG_DWORD   *60 - infinity*

Indicates the interval in seconds at which the master browser ages its browse lists and updates its lists with the domain master browser.

Default: 720 seconds (12 minutes)

You can change the value of this key using the AS/U Administrator.

> **i** This parameter will influence network traffic (e.g. in a WAN environment) between Master Browsers and Domain Master Browsers (usually the PDC).

MoreLog   REG_DWORD   *0 or 1*

> Indicates whether the Computer Browser service should record additional system log entries for events such as election packets that the Computer Browser service receives and the role of the browser server (master or backup).
>
> Default: 0 (do not record additional entries)
>
> You can change the value of this key using the AS/U Administrator.

WinsServer

> This key is obsolete in the Siemens Advanced Server for UNIX.

13.8 EventLog Service Entries

The subkey for EventLog contains at least three subkeys for the three types of logs — Application, Security, and System. These *logfile* subkeys contain subkeys that define the locations of the related event message files and the supported types of events, as follows:

- Application — Perflib, Perfmon, Replicator, RemoteBoot.

- Security — LSA, SC Manager, Security, Security Account Manager, Spooler.

- System — Alerter, Browser, EventLog, NetLogon, Print, Rdr, SAM, server, Service Control Manager, Srv, Wins, workstation.

Each of the three logfile subkeys for the EventLog service can contain the value entries described in this section. The Registry path for these entries is the following, where *logfile* is System, Application, or Security.

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\EventLog\logfile
```

These entries are described for informational purposes only. This information is usually maintained by Event Viewer.

File   REG_EXPAND_SZ   *Path and file name*

> Specifies the fully qualified path name of the file for this log.
>
> Default: `%SystemRoot%\var\opt\lanman\logs\`*filename*

MaxSize   REG_DWORD   *Multiples of 64 KBytes*

> Specifies the maximum size of the log file. This value can be set using the Event Viewer.
>
> Default: 524288 (512 KBytes)

Retention   REG_DWORD   *0 to infinity*

Specifies in seconds that records newer than this value will not be overwritten. This is what causes a log full event. This value can be set using the Event Viewer.

Default: 604800 seconds (7 days)

Sources   REG_MULTI_SZ   *List*

Specifies the applications, services, or groups of applications that write events to this log. Each source may be a subkey of the logfile subkey. (The appsources, secsources, and syssources keys also are in the *lanman.ini* file.)

Default: (varies according to log file)

The subkeys under a logfile subkey are created by the applications that write events in the related event log. These subkeys contain information specific to the source of an event under the following types of value entries.

EventMessageFile   REG_EXPAND_SZ   *Character string*

Specifies the path and file name for the event identifier text message file.

CategoryMessageFile   REG_EXPAND_SZ   *Character string*

Specifies the path and file name for the category text message file. The category and event identifier message strings may be in the same file.

CategoryCount   REG_DWORD   *0 to infinity*

Specifies the number of categories supported.

TypesSupported   REG_DWORD   *0 to infinity*

Specifies a bitmask of supported types.

13.9 Lanman Server Parameters

The Registry path that contains entries for the Advanced Server LAN Manager service is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\LanmanServer\Parameters
```

AccessAlert   REG_DWORD   *0 - infinity*

Specifies the number of resource access violations that can occur before the server sends an alert to the alertnames list.

Default: 5

You can change the value of this key using the AS/U Administrator.

AutoDisconnect   REG_DWORD   *0 - 3600 (60 hours)*

Specifies the interval in minutes that the server waits before dropping the virtual circuit to an inactive client.

Default: 0 (no automatic disconnect)

You can change the value of this key using the AS/U Administrator.

EnableSecuritySignature REG_DWORD *0 or 1*

Specifies whether SMB signing is enabled on the server. SMB signing provides mutual authentication which prevents "man-in-the-middle" attacks. SMB signing imposes a performance penalty on the system. Although it does not consume any additional network bandwidth, it does use more CPU cycles on the client and server side.

Default: 0

ErrorAlert   REG_DWORD   *0 - infinity*

Specifies the number of errors that can occur before the server sends an alert to the alertnames list.

Default: 5

You can change the value of this key using the AS/U Administrator.

Hidden   REG_DWORD   *0 or 1*

Specifies whether the server is hidden on the network. If the server is not hidden, it announces its presence set in the SrvAnnounce and LmAnnounce keys.

Default: 0 (server is visible)

You can change the value of this key using the AS/U Administrator.

LmAnnounce   REG_DWORD   *0 or 1*

Specifies whether a server should announce itself with the old LAN Manager-type announcement in addition to the new Windows NT-type announcement. This key has an effect only if the value of the Hidden key is 0.

Default: 0 (Use only Windows NT-type announcement.)

You can change the value of this key using the AS/U Administrator.

LogonAlert   REG_DWORD   *0 - infinity*

Specifies the number of logon violations that can occur before the server sends an alert to the alertnames list.

Default: 5

You can change the value of this key using the AS/U Administrator.

MaxMpxCt   REG_DWORD   *1 - 100*

Provides a suggested maximum to clients for the number of simultaneous requests outstanding to this server.

Default: 50

NullSessionShares   REG_MULTI_SZ   *List of shares*

List of the file shares the client is allowed to access by using the null session. If a share is not on this list, the request to access it will be denied. NullSessionShares is *not* updated automatically to the server if any changes are made; you must stop and re-start the server.

Default: *none*

RequireSecuritySignature   REG_DWORD   *0 or 1*

Specifies whether a server requires all of its clients to use SMB signing. If a client does not have security signatures enabled, it will not be able to connect to a server that requires security signatures.

Default: 0

SrvAnnounce   REG_DWORD   *1 - infinity*

Specifies the interval in seconds at which the server announces its presence to the network. This key has an effect only if the value of the Hidden key is 0.

Default: 180 (3 minutes)

You can change the value of this key using the AS/U Administrator.

SrvComment   REG_SZ   *String up to 48 characters*

Specifies the descriptive comment that the server sends when it announces its presence to the network.

Default: Advanced Server for UNIX systems

UserPath   REG_SZ   *Path*

Specifies the UNIX system directory on the server to be used as a default parent directory for home directories for new user accounts.

Default: c:\home\lanman

13.10   Lanman Server Shares

The Lanman Server Shares subtree contains, in an internal format, all of the information that was stored in the file sharefile prior to Advanced Server for UNIX V4.0A.

⚠ You must never modify the contents of this key using Registry Editor or the *regconfig* utility, rather simply use the *net share* and *lmshare* commands to edit the list of shared resources.

13.11   Net Logon Service Parameters

The Registry path that contains entries for the Advanced Server Net Logon service is as follows:

`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Netlogon\Parameters`

LogonQuery   **REG_DWORD**   *60 - infinity*

Specifies the interval, in seconds, at which the server checks if linked clients are still active.

Default: 900 (15 minutes)

You can change the value of this key using the AS/U Administrator.

Pulse   **REG_DWORD**   *60 - 3600 (1 hour)*

Specifies the interval, in seconds, for sending update notices when no updates are occurring to the master user accounts database. This keyword applies only to a primary domain controller and is ignored by other servers.

Default: 300 (5 minutes)

You can change the value of this key using the AS/U Administrator.

ⓘ This parameter can be used to reduce network traffic between a Primary Domain Controller and its Backup Domain Controllers, e.g. in a WAN environment.

QueryDelay   **REG_DWORD**   *1 - infinity*

Specifies the interval in seconds that a client can wait before responding to the server's inquiry about whether it is active.

Default: 2

You can change the value of this key using the AS/U Administrator.

Randomize   REG_DWORD   *5 to 120*

Specifies the time period in seconds within which a backup domain controller randomizes its request to a PDC for updates after receiving an update notice. This keyword decreases the odds of servers in the same domain requesting an update from the primary domain controller at the same time.

Default: 30 seconds

You can change the value of this key using the AS/U Administrator.

RefusePasswordChange   REG_DWORD   *0 or 1*

Specifies whether to disable the ability to accept machine account password changes. Machine account password changes normally occur weekly. Disabling automatic machine password changes reduces account replication occurrences and can reduce network traffic between primary and backup domain controllers.

Default: 0 (Password changes are allowed)

RelogonDelay   REG_DWORD   *1 - infinity*

Specifies the interval in seconds that a client can wait before logging back on to the server after the server has been stopped and restarted.

Default: 2

You can change the value of this key using the AS/U Administrator.

Scripts   REG_EXPAND_SZ

Specifies the location of the logon scripts directory.

Default on primary domain controller:

```
 %SystemRoot%\var\opt\lanman\shares\asu\repl\export\scripts
```

Default on backup domain controller:

```
%SystemRoot%\var\opt\lanman\shares\asu\repl\import\scripts
```

You can change the value of this key using the AS/U Administrator.

SSIPasswdAge   REG_DWORD   *86400 (24 hours) - infinity*

Specifies the time, in seconds, at which a backup domain controller must change the password that it sends to the primary domain controller to verify its eligibility to receive user accounts database updates.

On a PDC of a trusting domain, the parameter specifies the time at which this PDC must change the password at a domain controller of the trusted domain.

Values: 604800 (7 days)

You can change the value of this key using the AS/U Administrator.

Update   REG_DWORD   *0 or 1*

If this value is set, the server synchronizes the user accounts database with the primary domain controller every time it starts. This keyword applies only to a backup domain controller and is ignored by the primary domain controller. Note that full synchronization is a very time-consuming operation.

Default: 0 (do not synchronize)

You can change the value of this key using the AS/U Administrator.

13.12 Netrun Service Parameters

The Registry path that contains entries for the Advanced Server Netrun service is as follows:

`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Netrun\Parameters`

MaxRuns   REG_DWORD   *1 to 10*

Sets the maximum number of netrun requests that can run simultaneously.

Default: 3

RunPath   REG_SZ   *Path up to 256 characters*

Sets the path where programs accessible via the Netrun service are located. Only programs located in a runpath can be executed from a client or another server. Separate multiple path entries with colons (:).

Default: /tmp

13.13   Replicator Service Entries

The Registry path that contains entries for the Advanced Server Directory Replicator service is as follows:

`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Replicator\Parameters`

ExportList   REG_SZ   *Character string*

Lists an unlimited number of servers or domains that receive notices when the export directory is updated. These servers subsequently replicate from the export server. If no value is specified, the export server sends a notice to its domain. Separate multiple names with a semicolon (;). This value is ignored if the value of the Replicate key is 2 (Import).

Do not use the UNC name when you specify a computername; that is, do not include two backslashes (\\) at the beginning of the name.

Default: (local domain name)

ExportPath   REG_SZ or REG_EXPAND_SZ   *Pathname*

Specifies the export path. All files to be replicated must be in a subdirectory of the export directory. This value is ignored if the value of the Replicate key is set to 2 (Import).

Default: C:\var\opt\lanman\shares\asu\repl\export

GuardTime   REG_DWORD   *0 to one-half of* **Interval**

Sets the number of minutes an export directory must be stable (no changes to any files) before import servers can replicate its files.

This option applies only to directories with tree integrity.

Default: 2

ImportList   REG_SZ   *Character string*

Lists an unlimited number of servers or domains from which files and directories are to be replicated. If no value is specified, files and directories will be replicated from the server's domain. Separate multiple names with a semicolon (;). This value is ignored if the value of the Replicate key is 1 (Export).

Do not use the UNC name when you specify a computer name; that is, do not include two backslashes (\\) at the beginning of the name.

ImportPath   REG_SZ or REG_EXPAND_SZ   *Pathname*

Specifies the path on the import server to receive replicas from the export servers. This value is ignored if the value of the Replicate key is 1 (Export).

Default: C:\var\opt\lanman\shares\asu\repl\import

Interval   REG_DWORD   *1 to 60*

Specifies how often in minutes an export server checks the replicated directories for changes. Used in conjunction with the Pulse key. Ignored on import servers.

Default: 5

MaxFilesInDirectory   REG_DWORD   *0 to infinity*

Specifies the maximum number of files in an import directory that can be replicated.

Default: 2000

Pulse   REG_DWORD   *1 to 10*

Specifies in minutes how often the export server repeats sending the last update notice. These repeat notices are sent even when no changes have occurred, so that import servers that missed the original update notice can receive the notice. The server waits the equivalent of (Pulse * Interval) minutes before sending each repeat notice.

Default: 3

Random   REG_DWORD   *1 to 120*

Specifies the maximum time in seconds that the import servers can wait before requesting an update. An import server uses the export server's value of Random to generate a random number of seconds (from 0 to the value of Random). The import server waits this long after receiving an update notice before requesting the replica from the export server. This prevents the export server from being overloaded by simultaneous update requests.

Default: 60

Replicate   REG_DWORD   *1, 2, or 3*

Specifies the Replicator action, according to the following:

1 = Export — the server maintains a master tree to be replicated.

2 = Import — the server receives update notices from the export server.

3 = Both — the server is to export and import directories or files.

Default: Varies with role of server

TryUser   REG_DWORD   *0 or 1*

Specifies whether the import server should try to update directories when a user name is logged on locally.

Default: 1

UnixDirectoryGroup   REG_SZ   *Character string*

Specifies the UNIX system group account name for replicated directories.

Default: DOS----

UnixDirectoryOwner   REG_SZ   *Character string*

Specifies the UNIX system user account name for replicated directories.

Default: lmxadmin

UnixFileGroup   REG_SZ   *Character string*

Specifies the UNIX system group account name for replicated files.

Default: DOS----

UnixFileOwner   REG_SZ   *Character string*

Specifies the UNIX system user account name for replicated files.

Default: lmxadmin

13.14 UPS Service Parameters Entries

The Registry path that contains entries for the Advanced Server Uninterrupted Power Source service is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\UPS\Parameters
```

IgnoreSIGPWR   REG_DWORD   *0 or 1*

Specifies whether UPS service will be enabled.

Default: 1 (disables UPS service)

You can change the value of this key using the AS/U Administrator.

PowerFailAddress   REG_SZ   *String up to 15 characters*

Specifies the NetBIOS name to which the server sends a message when it receives a SIGPWR signal.

Default: * (all users)

You can change the value of this key using the AS/U Administrator.

PowerFailMessage   REG_SZ   *String up to 500 characters*

The text of the message to be sent by the server when it receives a SIGPWR signal.

Default: "The system has experienced a power failure. Please close all applications and files and log off immediately".

You can change the value of this key using the AS/U Administrator.

PowerMessageInterval   REG_DWORD   *0 - infinity*

Specifies the interval in minutes at which the server repeats the message sent when it receives a SIGPWR signal. A value of 0 would indicate to send the message one time only.

Default: 1

You can change the value of this key using the AS/U Administrator.

13.15 WINS Service Parameters

The registry path that contains entries for the Advanced Server WINS service is as follows:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Wins
```

The `\Parameters` subkey list all of the non-replication-related parameters needed to configure a WINS server. It also contains a `\Datafiles` subkey, which lists all the files that should be read by WINS to initialize or reinitialize its local database. The following parameter under the `\Parameters` subkey can be set only by changing the value in the Registry.

DoStaticDataInit   REG_DWORD   *0 or 1*

> If this parameter is set to a non-zero value, the WINS server will initialize its database with records listed in one or more files listed under the `\Datafiles` subkey. The initialization is done at process invocation and whenever a change is made to one or more values of the `\Parameters` or `\Datafiles` keys (unless the change is to modify the default value of `DoStaticDataInit`).

> The `\Wins\Parameters\Datafiles` key lists one or more files that the WINS server should read to initialize or reinitialize its local database with static records. If the full path of the file is not listed, the directory of execution for the WINS server is assumed to contain the data file. The parameters can have any names (for example, DF1 or DF2). Their data types must REG_EXPAND_SZ or REG_SZ. The files should contain LMHOSTS-formatted name-to-IP-address mappings. Existing files using a *names.cfg* format (see section "The names.cfg file") can be converted to LMHOSTS format using the tool */var/opt/nbrfc/bin/names2lm* (see section "/var/opt/nbrfc/bin/names2lm").

The `\Partners` subkey has two subkeys, `\Pull` and `\Push`, under which are subkeys for the IP addresses of all push and pull partners, respectively, of the WINS server.

A *push partner*, listed under the `\Partners\Pull` key, is one from which a WINS server pulls replicas and from which it can expect update notification messages. The following parameter appears under the IP address for a specific push partner. This parameter can be set only by changing the value in the Registry.

MemberPrec   REG_DWORD   *0 or 1*

> Specifies the order of precedence for this WINS partner, with 0 indicating low precedence and 1 indicating high precedence. Notice that dynamically registered names are always high precedence. When a 1C name is pulled from this WINS partner, the addresses contained in it are given this precedence level. The value can be 0 (low) or 1 (high). Set this value to 1 if this WINS server is serving a geographic location that is nearby.

14 Lanman.ini File

This chapter lists and describes the *lanman.ini* file parameters that can be modified to improve Advanced Server performance. It also contains tables which indicate the disposition of parameters that were in earlier versions of the *lanman.ini* file and now are in the Advanced Server Registry.

When Advanced Server is installed, the *lanman.ini* file contains some default parameter values. Other parameters and the titles of the sections in which they reside are added when you change the Advanced Server configuration. Only parameters that have been changed to values other than their default values are added to the *lanman.ini* file. If a parameter does not appear in the file (or is commented out with a semicolon), it is set to its default value.

Before attempting to change any of the parameters available in the *lanman.ini* file, it is useful to understand the relationship between the *lanman.ini* file entries and server defaults.

Every server parameter has a default setting. To display and edit default settings, a utility program called **srvconfig** is provided in the */var/opt/lanman/bin* directory.

You can edit the *lanman.ini* file to set parameters to values other than the defaults. A valid value assigned to any parameter in the *lanman.ini* file always supersedes the default value for that parameter.

When you want to set the value of a parameter to something other than the default, you must edit the *lanman.ini* file, locate (or add) the appropriate section title in the file, and then add the desired "parameter=value" entry.

14.1 Syntax

Within each section of the *lanman.ini* file, parameters are listed as follows:

- The name of each parameter is at the beginning of a line, followed by an equal sign and the value assigned to it: parameter=value.

- Comments start with a semicolon (;). If a semicolon precedes a parameter on the line, that parameter is ignored.

- When a list of values is assigned to a parameter, the values are separated by commas: parameter=value,value,value, ... (There are some exceptions to this rule, which are noted in the description of the appropriate parameters.)

- When a value consists of a path, the path may be absolute, starting with / . If a path does not start with / , it is assumed to be relative to the *lanman* directory.

- If a numeric value begins with 0 it is octal; if it begins with X, it is hexadecimal; if it begins with a number from 1 to 9, it is decimal.

- When a parameter has no assigned value (nothing to the right of the equal sign), the value is 0 for a parameter that requires a number and null for a parameter that requires a character string.

- A null value is not valid for all parameters.

► To change a parameter in the lanman.ini file

1. Use the **srvconfig** command to display default settings for the server parameters:

       /var/opt/lanman/bin/srvconfig -p | more

2. Edit the *lanman.ini* file using *vi* or a similar text editor. You may have to add a section heading to the file, for example [lmxserver]. You then need to add a "parameter=value" pair to the appropriate section of the *lanman.ini* file.

3. After you edit the file, you must stop and restart the server in order for the new values to take effect.

You also can use the **srvconfig -s** command to set parameter values in the *lanman.ini* file, as follows:

    /var/opt/lanman/bin/srvconfig -s "section,parameter=value"

For more information about the **srvconfig** command, type **man srvconfig** at the Advanced Server command prompt.

14.2 Parameters

The following sections describe the configurable parameters in the *lanman.ini* file. The parameters are grouped according to the section of the *lanman.ini* file in which they reside.

| i | The lanman.ini file contains additional parameters that are not included in the following tables. These parameters are for debugging purposes and should never be modified. |

[server] Section Parameters	
Parameter	**Description, Values, and Default Setting**
listenname	This is the server's name on the network. To change the value of the listenname parameter, use the **setservername** command. For more information about this command, type **man setservername** at the Advanced Server command prompt. Values: any servername of 1-15 characters default: null
maxclients	Identifies the maximum number of simultaneous client sessions that the server must support. This number is set by default to 250. It can be increased to a number that is equal to the Advanced Server user licence.
ProductType	Specifies the type of installed Advanced Server for UNIX. Possible values are ServerNT and LanmanNT. This parameter is set to the correct value automatically when Advanced Server for UNIX is configured and must not be changed. Default: LanmanNT
srvservices	The list of keywords for the services that start automatically when the server is started. Because services are started in the order they appear in the srvservices entry, you must ensure that netlogon appears before any services that require it. Default: alerter, netlogon, browser

[workstation] Section Parameters	
Parameter	**Description, Values, and Default Setting**
domain	The name of the domain that includes the server. To change the value of the listenname parameter, use the **setdomainname** command. For more information about this command, type **man setdomainname** at the Advanced Server command prompt. Values: any domain name of 1-15 characters default: domain

[lmxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
anncmailslot	The name of the mailslot used for periodic server announcements. Values: A path up to a maximum of 256 characters; default: *\MAILSLOT\LANMAN Note that back slashes must be doubled on input or else the entire input line must be enclosed in single quotation marks. (Type *text\\text* or *'text\text* ' to enter text with a single back slash.)
appsources	The names of the modules that can write to the application log. Default: The server initializes the value of this parameter at startup.
clispooltime	The interval, in minutes, allowed for a job sent to a shared client printer to complete printing. If the printing has not finished by the end of this time, a warning message is sent to the server administrator. Values: 0 (no warning message) - unlimited; default: 20

(continued)

[lmxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
country	The Country code(not used for localized messages) Values:

Country	Code	Country	Code
Asia	099	Latin America	003
Australia	061	Netherlands	031
Belgium	032	Norway	047
Canada	002	Portugal	351
Denmark	045	Spain	034
Finland	358	Sweden	046
France	033	Switzerland	041
Germany	049	United Kingdom	044
Italy	039	United States	001
Japan	081		
Default: 001			

Parameter	Description, Values, and Default Setting
dll_dir	The path to the directory containing message text files used by Advanced Server for UNIX system commands. To change the value of the listenname parameter, use the **setlang** command. For more information about this command, type **man setlang** at the Advanced Server command prompt. Default: */var/opt/lanman/shares/asu/system32/001*
domainlang	Entry corresponding to the selection of the domain language during installation. To change the value of the listenname parameter, use the **setdomainlang** command. For more information about this command, type **man setdomainlang** at the Advanced Server command prompt. Default: 001 (English)
lang	Defines the character set that Advanced Server uses for processing client requests. Default: De_DE.88591

(continued)

[lmxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
listenextension	The extension that the UNIX system listener program, by default, applies to the name of the server computer. This parameter is ignored. Siemens does not use the UNIX listener. Values: 0-13 characters and a null value are acceptable. Default: null
listennamechk	If set to yes, it forces any name specified with the listenname parameter to be different than the UNIX machine name or the UNIX machine name with the *listenextension* extension in order to avoid name conflicts with the UNIX listener. N.B. : Siemens does not use the UNIX listener. Default: no
listenqlen	Maximum number of client connection requests outstanding. If the server supports numerous clients that all attempt to connect to the server simultaneously, and some get refused, you should raise the value of this parameter. Only applicable if the listenname= parameter is being used. Values: 1 - unlimited; default: 3
lmaddonpath	The directory for dynamic libraries bound into the server program and called at various times during server execution, as described in the */var/opt/lanman/include/lmaddon.h* header file. The server looks for these dynamic libraries on startup. Values: A path up to a maximum of 256 characters; default: */var/opt/lanman/addon/lmaddon*
lmgetmsg_path	Search order for message text files used by Advanced Server. Default: netmsg.dll, kernel32.dll, locallspl.dll, asumsg.dll
lmxspooler	Entry corresponding to the selection of the spooler during installation. Default: ATTHPI

(continued)

[lmxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
lptmpdir	The location of the spooling directory for temporary files used by the UNIX system's LP subsystem. Default: */var/spool/lp/tmp/uname* where *uname* is the server's UNIX system name.
mapaclblob	Configures whether to use memory-mapped file operations when accessing the Advanced Server Access Control List database. Values: yes, no; default: yes
mapchangelogblob	Configures whether to use memory-mapped file operations when accessing the Advanced Server Change Log database. Values: yes, no; default: no
maplsablob	Configures whether to use memory-mapped file operations when accessing the Advanced Server Local Security Authority database. Values: yes, no; default: no
mapregistryblob	Configures whether to use memory-mapped file operations when accessing the Advanced Server Registry database. Values: yes, no; default: no
mapsamblob	Configures whether to use memory-mapped file operations when accessing the Advanced Server Security Accounts Manager database. Values: yes, no; default: no
maxfilesize	The maximum file size, in KBytes, that the UNIX system redirector will allow a "local UNIX user" to create on a local system. Values: 100 - unlimited; default: 100000
maxspoolfds	This parameter is only evaluated if the lmxspooler parameter is set to "SPOOLV4". It specifies the number of file descriptors in the lower range that are to be reserved for calls to Spool/Xprint. The parameter is set optimally for the current Spool/Xprint versions and may only be changed by Technical Support. Default: 4

(continued)

[lmxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
msgforward	Specifies if Advanced Server implements message forwarding between clients. Implementation of message forwarding is not recommended. Values: yes (implement forwarding) or no (do not implement forwarding); default: no
nativelm	An additional field in the session setup request/response. Default: Advanced Server 4.0 for UNIX systems
nativeos	An additional field in the session setup request/response. Default: Identifier for operating system release.
netaddonpath	The directory in which the Advanced Server looks for dynamic libraries on startup. Dynamic libraries found in the directory are bound into the Advanced Server and used to access the various network interfaces on the server computer. Values: A path up to a maximum of 256 characters; default: */var/opt/lanman/addon/networks*
nethelpfile	The location of the help file used by the net help command (relative to */var/opt/lanman/msgfiles).* Default: */var/opt/lanman/msgfiles/001/net.hlp*
netmsgwait	The interval, in seconds, that the server waits for a response when it sends a message that requires one. Values: 0 - unlimited; default: 30

(continued)

[Imxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
network	The network device names and NetBIOS name-passing type for the network(s) the server should use. Values: sets of four items separated by commas, each set of four separated from the next by a space. The following four items are in each set:
	1. The device name for virtual circuit access.
	2. The device name for datagram network access.
	3. A digit identifying the NetBIOS interface convention used by the two devices above. Currently there is one convention compiled into the server: 0 = RFC 1001/2 NetBIOS convention
	4. The name of the transport provider, as returned by the nlsprovider system call. (For networks not configured to accept incoming connections through the UNIX system listener program, this can be any arbitrary string.)
	Default: /dev/inet/nb,/dev/inet/nbd,0,nbrfc
newpoll	Specifies whether the new Reliant UNIX poll interface is to be used. If Reliant UNIX does not support the new poll, the old poll is used automatically. Default: yes
os2searchfix	As a result of a AS/X fix for NT clients, problems have arisen since AS/X 4.0A1001 with OS/2 clients displaying files and directories. There is no final solution to the problem at present, which is why this parameter can be used to set the new or old behavior. Please read the readme files supplied to establish whether this parameter is still required in the current version.
	os2searchfix=no:
	– OS/2 "folder" shows either no files or one file
	– OS/2 "dir" in the DOS box shows at most 100 files
	os2searchfix=yes:
	– Deleting a directory tree on Windows NT 4.0 with "deltree" does not delete all files.
	Default : no

(continued)

[lmxserver] Section Parameters	
Parameter	**Description, Values, and Default Setting**
prebinduxredir	Controls the name that the UNIX system Net command binds when it uses the UNIX system redirector (uxredir). If this parameter is set to yes, the server pre-binds a NetBIOS name that will be used by all UNIX system Net commands. Because this name is pre-bound, the Net command does not need to bind its own name, and this quickens the UNIX system's Net access to the server. If this parameter is set to no, then each Net command will use its own unique name with somewhat slower performance resulting. ⚠️ If the Advanced Server NetBIOS names are registered dynamically with a WINS server, you should not set prebinduxredir to no, as otherwise the WINS database can become extremely large because of the different names for the individual Net commands. Values: yes, no; default: yes
secsources	The names of the modules that can write to the security log. Default: The server initializes the value of this parameter at startup.
srvstathelpfile	The location of the help file used by the Activity Monitor. Default: */var/opt/lanman/msgfiles/001/srvstat.hlp*
stacksize	The size of the stack, in bytes, for each task internal to the server. Values:12000 - unlimited; default: 30000
syssources	The names of the modules that can write to the system log. Default: The server initializes the value of this parameter at startup.
tcp_nodelay	⚠️ Since AS/X V4.0B, the tcp_nodelay parameter is no longer supported. The functionality will be set by a parameter when NetBIOS is started. See the chapter "Configuring NetBIOS".

[fsi] Section Parameters	
Parameter	**Description, Values, and Default Setting**
fsaddonpath	The location of dynamic link libraries that support file systems on the server. Values: A path up to a maximum of 256 characters; default: */var/opt/lanman/addon/fsaddon*
fslibname	The subdirectory of the directory identified by fslibpath where new file systems are located. Values: A path up to a maximum of 256 characters; default: *lmfsiops.so*
fslibpath	The location of new file systems on the server. Values: A path up to a maximum of 256 characters; default: */usr/lib/fs*
fsmap	File system type identifiers that map unknown file systems to known file system types. Values: a comma-separated list of mappings; default: unknown:s5,nfs:nfs,vxfs:ufs,sfs:ufs,hs:ufs,cdfs:ufs, memfs:ufs
fsnosupport	Maps unknown file system to specified file system. Default: s5
remotemounts	The names of file system types that indicate remotely mounted file systems. Default: nfs

[psi] Section Parameters	
Parameter	**Description, Values, and Default Setting**
psaddonpath	The location of dynamic link libraries that support printer subsystems on the server. Values: A path up to a maximum of 256 characters; default: */var/opt/lanman/addon/psaddon*

14.3 Lanman.ini Parameter Mapping to Registry Keys

The following tables list the parameters in the *lanman.ini* file that existed in earlier versions of Advanced Server and whether they have been moved to the Advanced Server Registry, to the new *lanman.ini* file, or are obsolete. The parameters that were moved to the Advanced Server Registry are listed with their new value names.

The *lanman.ini* file parameters are listed according to the sections in which they reside in the file.

[Server] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
accessalert	LanmanServer\Parameters	AccessAlert
alertnames	Alerter\Parameters	AlertNames
autodisconnect	LanmanServer\Parameters	AutoDisconnect
enablesoftcompat	AdvancedServer\FileServiceParameters	EnableSoftCompat
enable_soft_file_ext	AdvancedServer\FileServiceParameters	EnableSoftFileExtensions
erroralert	LanmanServer\Parameters	ErrorAlert
listenname[1]	Control\ComputerName\ComputerName	ComputerName
logonalert	LanmanServer\Parameters	LogonAlert
maxauditlog	EventLog\Security	MaxSize
maxclients	None (*lanman.ini* file)	
maxerrlog	EventLog\System	MaxSize
srvannounce	LanmanServer\Parameters	SrvAnnounce
srvcomment	LanmanServer\Parameters	SrvComment
srvhidden	LanmanServer\Parameters	Hidden
srvservices	None (*lanman.ini* file)	
userpath	LanmanServer\Parameters	UserPath
[1] The listenname parameter is in the *lanman.ini* file as well as the Advanced Server Registry under \SYSTEM\CurrentControlSet\Control\ComputerName\ComputerName.		

[Workstation] Section Parameter Mappings to Registry Keys		
Lanman.ini Parameter	**Advanced Server Registry Key Name**	**Value Name**
domain	None (*lanman.ini* file)	

[Uidrules] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
exclude	AdvancedServer\UserServiceParameters	Exclude
forceunique	AdvancedServer\UserServiceParameters	ForceUniqueUnixUserAccount
maxuid	AdvancedServer\UserServiceParameters	MaxUnixUid[1]
minuid	AdvancedServer\UserServiceParameters	MinUnixUid[1]
usrcomment	AdvancedServer\UserServiceParameters	UserComment
[1] These values are not displayed by default but can be configured in the Advanced Server Registry.		

[Netlogon] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
logonquery	Netlogon\Parameters	LogonQuery
maxclisess	AdvancedServer\ProcessParameters	NumCLIENT_SESSION
maxquery	None (obsolete)	
maxsrvsess	AdvancedServer\ProcessParameters	NumSERVER_SESSION
pulse	Netlogon\Parameters	Pulse
querydelay	Netlogon\Parameters	QueryDelay
randomize	Netlogon\Parameters	Randomize
relogondelay	Netlogon\Parameters	RelogonDelay
scripts	Netlogon\Parameters	Scripts
ssipasswdage	Netlogon\Parameters	SSIPasswdAge
update	Netlogon\Parameters	Update

[lmxserver] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
aclfile	None (obsolete)	
aclgroup	None (obsolete)	
aclowner	None (obsolete)	
aclperms	None (obsolete)	
admingroupid	AdvancedServer\NetAdminParameters	NetAdminGroupName
adminpath	AdvancedServer\NetAdminParameters	NetAdminPath
adminuserid	AdvancedServer\NetAdminParameters	NetAdminUserName
alertadmin	None (obsolete)	
alerterrorlog	None (obsolete)	
alertmessage	None (obsolete)	
alerton	None (obsolete)	
alertprinting	None (obsolete)	
alerttimeout	AdvancedServer\AlertParameters	ConnectTimeout
alertuser	None (obsolete)	
anncmailslot	None (*lanman.ini* file)	
appretention	Eventlog\Application	Retention
appsources	Eventlog\Application	Sources
auditretention	Eventlog\Security	Retention
blobmapping	None (obsolete)	
byemessage	AdvancedServer\Parameters	SendByeMessage
clispooltime	None (*lanman.ini* file)	
cntsharecache	None (obsolete)	
cntsharereads	AdvancedServer\ShareParameters	ShareReadCount
controllock	None (obsolete)	
coreok	AdvancedServer\ProcessParameters	CoreOK
country	None (*lanman.ini* file)	
cpipgroup	None (obsolete)	

(continued)

[lmxserver] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
cpipname	None (obsolete)	
cpipowner	None (obsolete)	
cpipperms	None (obsolete)	
createunixuser	AdvancedServer\UserServiceparameters	CreateUnixUser
dirperms	AdvancedServer\FileServiceParameters	UnixDirectoryPerms
eafileprefix	AdvancedServer\FileServiceParameters	EAFilePrefix
errorretention	Eventlog\System	Retention
errsources	None (obsolete)	
feabufsize	AdvancedServer\FileServiceParameters	MaxEASize
fileflush	AdvancedServer\FileServiceParameters	ForceFileFlush
fileperms	AdvancedServer\FileServiceParameters	UnixFilePerms
forcediracl	AdvancedServer\FileServiceParameters	ForceDirectoryAcl
forcefileacl	AdvancedServer\FileServiceParameters	ForceFileAcl
gcbuffer	AdvancedServer\Parameters	SizeGcBufferPoolInKB
getapipe	None (*lanman.ini* file)	
groupadd	None (obsolete)	
groupdel	None (obsolete)	
grpupdate	AdvancedServer\UserServiceParameters	GroupUpdateTime
hashsize	AdvancedServer\ProcessParameters	NumHashTables
ignoresigpwr	UPS\Parameters	IgnoreSIGPWR
ipctries	AdvancedServer\Parameters	MaxIpcTryCount
keepadmshares	AdvancedServer\ShareParameters	KeepAdministrative-Shares
listenextension	None (*lanman.ini* file)	
listennamechk	None (*lanman.ini* file)	
listenqlen	None (*lanman.ini* file)	
lmaddonpath	None (*lanman.ini* file)	
lmxmsgfile	None (*lanman.ini* file)	
lmxsrv	None (obsolete)	

(continued)

[lmxserver] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
lmxtimesource	None (obsolete)	
locale	None (obsolete)	
locknap	AdvancedServer\ProcessParameters	LockNapInMSec
lptmpdir	None (*lanman.ini* file)	
lsafile	None (obsolete)	
lsagroup	None (obsolete)	
lsaowner	None (obsolete)	
lsaperms	None (obsolete)	
mailslotgroup	None (obsolete)	
mailslothold	AdvancedServer\Parameters	MaxMailslotReadTime
mailslotowner	None (obsolete)	
mailslotperms	None (obsolete)	
maxadminoutput	None (obsolete)	
maxapplog	EventLog\Application	MaxSize
maxdirbufsize	AdvancedServer\Parameters	MaxDirectoryBufferSize
maxfilesize	AdvancedServer\FileServiceParameters	MaxFileSizeInKB
maxlocknap	AdvancedServer\ProcessParameters	MaxLockTimeInSeconds
maxmsdepth	None (obsolete)	
maxmsgsize	AdvancedServer\Parameters	MaxMessageSize
maxmux	LanmanServer\Parameters	MaxMpxCt
maxopenfiles	None (obsolete)	
maxrawsize	AdvancedServer\Parameters	MaxRawSize
maxvcperproc	AdvancedServer\ProcessParameters	MaxVCPerProc
maxsvcwait	AdvancedServer\Parameters	MaxServiceWaitTime
maxvcs	AdvancedServer\ProcessParameters	MaxVCs
memorymap	AdvancedServer\FileServiceParameters	MemoryMapFiles
minsmbworkers	AdvancedServer\ProcessParameters	MinSmbWorkerTasks
minvcperproc	AdvancedServer\ProcessParameters	MinVCPerProc

(continued)

[lmxserver] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
msdirgroup	None (obsolete)	
msdirname	None (obsolete)	
msdirowner	None (obsolete)	
msdirperms	None (obsolete)	
msgforward	None (*lanman.ini* file)	
msgheader	Alerter\Parameters	IncludeMessageHeader
nativelm	None (*lanman.ini* file)	
nativeos	None (*lanman.ini* file)	
netaddonpath	None (*lanman.ini* file)	
nethelpfile	None (*lanman.ini* file)	
nethmsgfile	None (obsolete)	
netmsgwait	None (*lanman.ini* file)	
network	None (*lanman.ini* file)	
newusershell	AdvancedServer\UserServiceParameters	NewUserShell
nfscheck	AdvancedServer\FileServiceParamaters	NfsCheck
nfslocks	AdvancedServer\FileServiceParameters	UseNfsLocks
nonexistusers	Alerter\Parameters	CountNotOnNetwork-Cache
nosendtime	Alerter\Parameters	NotOnNetworkCache-Timeout
numnetsndbufs	None (obsolete)	
oplocktimeout	AdvancedServer\FileServiceParameters	OplockTimeout
packageid	None (obsolete)	
passmgmt	None (obsolete)	
polltime	None (obsolete)	
prebinduxredir	None (*lanman.ini* file)	
qnamelen	AdvancedServer\Parameters	MaxPrintQueueName-Length

(continued)

[lmxserver] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
qsched	AdvancedServer\Parameters	CheckPrintQueueIn-Minutes
queuealloc	None (obsolete)	
rdatrend	AdvancedServer\FileServiceParameters	ReadAheadCount
relmajor	(\SOFTWARE\Microsoft\LanmanServer CurrentVersion (and elsewhere))	MajorVersion
relminor	(\SOFTWARE\Microsoft\LanmanServer CurrentVersion (and elsewhere))	MinorVersion
samdir	None (obsolete)	
samgroup	None (obsolete)	
samowner	None (obsolete)	
samperms	None (obsolete)	
sbstelladmin	AdvancedServer\AlertParameters	AlertAdminOnLicense-Overflow
sbstelluser	AdvancedServer\AlertParameters	AlertUserOnLicense-Overflow
schedlogfilename	None (obsolete)	
secsources	Eventlog\Security	Sources
sharefile	None (obsolete)	
sharegroup	None (obsolete)	
sharemkdir	AdvancedServer\ShareParameters	MakeUnixDirectories-OnShare
shareowner	None (obsolete)	
shareperms	None (obsolete)	
shmgroup	None (obsolete)	
shmowner	None (obsolete)	
shmperms	None (obsolete)	
spareserver	AdvancedServer\ProcessParameters	KeepSpareServer
sparesrvtime	AdvancedServer\ProcessParameters	SpareServerTime
spipe	None (obsolete)	

(continued)

[lmxserver] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
srvstathelpfile	None (*lanman.ini* file)	
stacksize	None (*lanman.ini* file)	
startscript	None (obsolete)	
stoponcore	AdvancedServer\ProcessParameters	StopOnCore
svcinit	None (obsolete)	
svcscript	None (obsolete)	
syncaclfile	AdvancedServer\FileServiceParameters	SyncAclFileOnWrite
synchomedir	AdvancedServer\UserServiceParameters	SyncUnixHomeDirectory
syssources	Eventlog\System	Sources
terminator	None (obsolete)	
timetodrop	AdvancedServer\ProcessParameters	TimeToDrop
tokensidlimit	None (obsolete)	
unixdirchk	AdvancedServer\FileServiceParameters	UnixDirectoryCheck
unixlocks	AdvancedServer\FileServiceParameters	UseUnixLocks
useoplock	AdvancedServer\FileServiceParameters	UseOplocks
userremark	AdvancedServer\UserServiceParameters	UserComment
ustructs	AdvancedServer\ProcessParameters	NumUStructs
uxclosecount	AdvancedServer\FileServiceParameters	UnixCloseCount
vcdistribution	AdvancedServer\ProcessParameters	VCDistribution
xpstat_dev	AdvancedServer\Parameters	CallXpstatDev

[vps] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
poweraddr	UPS\Parameters	PowerFailAddress
powermessage	UPS\Parameters	PowerFailMessage
powertime	UPS\Parameters	PowerMessageInterval

[Replicator] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
exportlist	Replicator\Parameters	ExportList
exportpath	Replicator\Parameters	ExportPath
guardtime	Replicator\Parameters	GuardTime
importlist	Replicator\Parameters	ImportList
importpath	Replicator\Parameters	ImportPath
interval	Replicator\Parameters	Interval
logon	Replicator	ObjectName
password	None (obsolete)	
pulse	Replicator\Parameters	Pulse
random	Replicator\Parameters	Random
repl_dirgroup	Replicator\Parameters	UnixDirectoryGroup
repl_dirowner	Replicator\Parameters	UnixDirectoryOwner
repl_dirperms	None (obsolete)	
repl_filegroup	Replicator\Parameters	UnixFileGroup
repl_fileowner	Replicator\Parameters	UnixFileOwner
repl_fileperms	None (obsolete)	
replicate	Replicator\Parameters	Replicate
tryuser	Replicator\Parameters	TryUser

[Fsi] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
closeinodecnt	None (obsolete)	
fsaddonpath	None (*lanman.ini* file)	
fslibname	None (*lanman.ini* file)	
fslibpath	None (*lanman.ini* file)	
fsmap	None (*lanman.ini* file)	
fsnosupport	None (*lanman.ini* file)	
maxfstypes	None (obsolete)	
nfsroot	AdvancedServer\FileServiceParameters	RootOwnsFilesCreated-OnNFS
ntfs	AdvancedServer\FileServiceParameters	ReportNTFS
remotemounts	None (*lanman.ini* file)	
volumelabel	AdvancedServer\FileServiceParameters	Volumelabel

[Psi] Section Parameter Mappings to Registry Keys		
Lanman.ini Parameter	**Advanced Server Registry Key Name**	**Value Name**
maxspoolers	None (obsolete)	
psaddonpath	None (*lanman.ini* file)	

[Version] Section Parameter Mappings to Registry Keys		
Lanman.ini Parameter	**Advanced Server Registry Key Name**	**Value Name**
lan_manager	None (obsolete)	

[Netrun] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
maxruns	NetRun\Parameters	MaxRuns
runpath	NetRun\Parameters	RunPath

[Browser] Section Parameter Mappings to Registry Keys		
Lanman.ini File Parameter	**Advanced Server Registry Key Name (\SYSTEM\CurrentControlSet\Services)**	**Value Name**
backuprecovery	Browser\Parameters	BackupRecovery
backupupdate	Browser\Parameters	BackupUpdate
lmannounce	LanmanServer\Parameters	LmAnnounce
masterupdate	Browser\Parameters	MasterUpdate
morelog	Browser\Parameters	MoreLog

Glossary

administration shell

Users can manage the *servers* from this shell. The administration shell can be called up for both local and remote administration.

administrator

The person responsible for the management of the *local network*. The administrator is generally responsible for the configuration of the local network and organizes the *shared resources* in the network. In addition, the administrator has the task of assigning privileges and assisting users with network problems.

Advanced Server

Advanced Server is a network operating system for *local networks*. Appropriate software is required on the *client* in order to request *services* (workstation distribution); software is also required on a *server* to process services (server distribution).

alerter

This service enables the *server* to send warning and error messages to a specific list of *client* users. These alarm messages deal with access violations when using *shared resources*, and exceeding important limit values (free storage area on the hard disk, maximum error rate for network and hard disk access and maximum number of logon attempts).

announce process

The *server* uses the announce process to announce itself at regular intervals in the network. This function is undertaken by the *Browser* in Advanced Server for UNIX.

Application Programming Interface (API)

Using the programming interface of Advanced Server for UNIX, the application programs are given access to the *services* and *shared resources* of Advanced Server for UNIX. *LM named pipes* or *mailslots* can be accessed, for example, from application programs.

auditing

The *server* records processes, such as net logon (*Netlogon*), and utilization of *resources* in an audit list. An entry in this list consists of the *username*, the type of resource as well as the date and time when the resource was used.

autodisconnect

The *server* interrupts a *session* if it determines no activity for this session within a specified period of time. If the relevant *client* wishes to access a *shared resource* again at a later stage then the session is implicitly reactivated when a resource is requested. A new "logon" or "net use" is not required.

backup domain controller

A *server* in a *domain* which manages a copy of the *user account database* and uses it to verify logon attempts. See also *Netlogon* and *primary domain controller*.

browser

Displays all resources of all *servers* throughout the network, including servers in other *domains*.

client

A client is a computer which uses the *services* and *shared resources* of another computer, the *server*, over a *local network*. A client cannot generally provide services to other computers.

computername

Name of a computer within a *local network*. Each computername is unique within a network.

connection

A connection is set up if a *client* can access a *shared resource* of a *server*. A client can have several connections to a server. This is provided when a *session* is opened between a client and a server.

distributed application

Processes on the server system exchange data with processes on *clients* over the *local network*. The resources of *interprocess communication IPC$* are used to exchange this data.

domain

A combination of *servers* and *clients*, which are joined in one administrative unit. See also *Netlogon security*.

domain controller

See *primary domain controller* and *backup domain controller*.

group

With *user level security*, a number of users (with *user accounts*) have common authorization for one or more *shared resources*. Individually assigned rights have precedence over those assigned through groups.

home directory

The directory in the file system of a multiuser system, in which a user is located after logging on to the system.

interprocess communication (IPC$)

Data exchange between processes which are active either on the same computer or on separate computers. In the second case, interprocess communication takes place in a *local network* using the *LM named pipe* and *Mailslot* mechanisms.

IPC$

An administrative resource for controlling *interprocess communication* on *servers*. The IPC$ resource of a server must be shared before any of the following actions can be undertaken: displaying the *shared resources* of the server, use of the *distributed applications* on the server by the user.

LM named pipe

LM named pipes (also known as OS/2 named pipes) are bidirectional communication channels for *interprocess communication* in the *local network* (similar to Berkeley sockets). They are not the same as UNIX named pipes.

lanman.ini

An Advanced Server for UNIX initialization file. The values in this file determine some of the parameters for the *server* in the *local network*, which deviate from the default values.

Local area network (LAN)

A local network consists of one or more *servers* and several *clients*. The server provides various *services* and *shared resources* for use by the clients. A network operating system controls all processes in the local network.

mailslot

A mailslot is similar to a mailbox. Any user in the *local network* who knows the name of the mailbox can send a message to it. Only the recipient can read the messages in the mailbox.

member server

A *server* in a *domain*, which retains and uses a copy of the *user account database* of the domain but does not verify netlogon requests.

This *server role* is not supported with Advanced Server for UNIX. In the case of an upgrade installation from LAN Manager/X, a member server receives the server role *backup domain controller*.

messenger

This *service* enables the *administrator* to send a message to a particular *client* user or to all client users in the *local network*.

message POPUP

A field on a *client* in which the incoming messages from other network users are shown when the *messenger* and the *Net POPUP* services are active.

NetBIOS

A software module which connects the operating system to the *local network* hardware and allows communication between the *clients* and the network.

Netlogon

This *service* implements *Netlogon security*. If Netlogon is operating on one *server* in the *domain*, then all *usernames* and *passwords*, which must be specified by all logged on users in the domain, are centrally verified. Netlogon runs on all servers participating in Netlogon security. This means that the *user account databases* are copied to all servers in the domain. See also *trust relationship*, *primary domain controller* and *backup domain controller*.

Netlogon domain

The domain in which the users log on to the *local network*.

Netlogon process

Stating of *usernames* and *passwords* in order to access the *local network*. When the *connection* to the resource is established, Advanced Server for UNIX verifies the username and password before access is granted. For *domains* with *Netlogon security*, the username and password must correspond to a valid user account on the *primary domain controller*.

Net POPUP

A client service which issues messages on the screen as they arrive from other users of the *local network* or *server*.

Netlogon security

Netlogon security includes the following measures: The verification of the identity of users at logon to the *local network* as well as the standardization of the *user account database* for a *domain* in a single user account database, copies of which are stored on all *servers* in the domain. With *Trust Relationship*, you can also access *shared resources* in other domains. See also *Netlogon*.

netrun

Netrun enables the execution of a UNIX program on the *server* from an OS/2 or an extended MS-DOS *client*.

password

A string used to access the network or one or more *shared resources*. See also *Netlogon security*.

primary domain controller

The *server* in a *domain* on which the original version of the *user account database* for this domain is maintained. The primary domain controller also verifies netlogon requests. See also *Netlogon*, *trust relationship* and *backup domain controller*.

Registry

A binary file containing server configuration data. The registry is *Windows NT* compatible and can be accessed by the same tools like a *Windows NT Registry*. For Advanced Server parameters stored in the registry see chapter "Advanced Server Registry".

replicator

A service which produces identical copies of specific files and directories on different systems with a corresponding import function.

resource

See: *shared resource*

RPC

Microsoft Remote Procedure Calls. A platform-independent mechanism for the interprocess communication in a client-server architecture.

security

A series of measures which enable the *administrator* to direct and control access to network resources. See also *Netlogon*.

server

A server or server system is a computer which provides *services* and *shared resources* to the *clients*. A server could maintain a file system, for example, which clients can access over a *local network*.

server name

Every *server* is assigned a unique name in the *local network*. Every *shared resource* of every server in the local network can be addressed from a client using the server name and the *sharename*. This is provided access authorization has been granted.

server role

The role assigned to a *server* which determines whether and how *Netlogon* is operating on this server. The server role can be a *backup domain controller* or *primary domain controller*.

server system

See: *server*

services

The services are the main components of Advanced Server for UNIX software. These include the workstation service, which enables a computer to use *shared resources* in a *local network*. The server service enables the server to share resources in a network. Other services are: *Netlogon*, *Auditing*, *Net POPUP*, *Netrun, Replicator, Alerter, Browser , Timesource, WINS* and *Messenger*.

session

A session is opened if a *client* has successfully logged on to a *server*. A session is required in order to set up one or more *connections* to individual *shared resources*. A client can have several sessions set up to several servers. See also *Netlogon*.

share

If a resource on a server is available to users in a local network, it is "shared". See also *shared resource*.

share level security

A type of security by means of which access to each *shared resource* is dependent upon a *password*. Rights are not assigned to the individual user but to the resource. This type of security is not supported by Advanced Server for UNIX. In the case of an upgrade installation from LAN Manager/X, the type of security is changed to *user level security*.

sharename

Every *shared resource* on a *server* has a unique name on the server system. No two resources on a server can have the same sharename, although they can be given the same sharename if they are on different servers within a *local network*. A user can request a specific resource on a server using the sharename.

share table

This list contains a description of all *shared resources* on a *server*, which are available for use in the *local network*.

shared client printer

In the case of a shared client printer, the output of the queue (of the UNIX spooler) is printed to a printer which is connected to a *client*.

shared directory

Directories in the file system of the *server*, which are shared for use in the *local network*. Shared directories include the files contained in these directories and additional directories.

shared printer

Printer connected to a *server*, which can be used as a *shared resource* in the *local network*. The incoming print requests are transferred by the *server* to the configured system spooler.

shared program

See *netrun*.

shared resource

A shared resource is a *server* resource which can be used by the *clients* via a *local network*. Examples of shared resources are directories, printers and the *interprocess communication resource (IPC$)*.

standalone server

A *server* with *user level security*, which organizes its own *user account database* and is not part of a *domain*. This server role is not supported with Advanced Server for UNIX. In the case of an upgrade installation from LAN Manager/X, a standalone server receives the server role *primary domain controller*.

subcommands

The *server* is managed using subcommands. If the server is managed from the operating system shell, the prefix net is placed before the subcommand: net <subcommand>.

timesource

An Advanced Server for UNIX service which identifies a *server* as a timesource for a domain. Other *servers* and *clients* can synchronize their clocks with the timesource. Exception: systems with UNIX **cannot** be synchronized.

timesource server

The server with the timesource service, which therefore serves as the *timesource* of the *local network*. The other *servers* and *clients* in the network synchronize themselves with the timesource server. An Advanced Server for UNIX server can only operate as a timesource server and not as a synchronized server.

trust relationship

Trust relationships are links between domains that enable pass-through authentication, in which a trusting domain honors the logon authentications of a trusted domain. With trust relationship, a user who has only one user account in one domain can potentially access the entire network. User accounts and global groups defined in a trusted domain can be given rights and resource permissions in a trusting domain, even though those accounts do not exist in the trusting domain's directory database.

user account

Consists of all the information that defines a user to the Advanced Server. This includes items such as the user name and password required for the user to log on, the groups in which the user account has membership, and the rights and permissions the user has for using the system and accessing its resources. For the Advanced Server, user accounts are managed with User Manager for Domains. See also *group*.

user account database

The data of the user accounts and the established groups is stored in the Advanced Server for UNIX databases. See also *user account* and *group*.

user level security

A type of security which manages a *user account* for each user. Each user then maintains rights for specific *shared resources* which describe which actions each user can operate with each resource. See also *password*.

username

Every user receives a unique name within a *local network*. Users use this name to log on to a *server* and to identify themselves.

WINS Service

Windows Internet Name Service (WINS) for Advanced Server provides a Windows NT compatible, replicated, dynamic database for registering and querying NetBIOS computer name-to-IP address mappings in a routed network environment. Advanced Server WINS is designed to solve the problems that occur with name resolution in complex internetworks.

workstation

See *client*.

Abbreviations

ACE	Access Control Entry
ACL	Access Control List
API	Application Programming Interface
AS/U	Advanced Server for UNIX
AS/X	Advanced Server for UNIX
BDC	Backup Domain Controller
BLOB	Binary Large Object
CDFS	CD File System
CMX	Communication Management under UNIX
DCE	Distributed Computing Environment
DHCP	Dynamic Host Configuration Protocol
DLL	Dynamic Link Library
DNS	Domain Name Service
EA	Extended Attributes (of HPFS)
EUC	Extended UNIX Code
FQDN	Fully Qualified Domain Name
HDLC	High Level Data Link Control
HPFS	High Performance File System
HS	High Sierra
ID	Identifier
IP	Internet Protocol
IPC	Interprocess Communication
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LIPC	Local Interprocess Communication
LM	LAN Manager
LSA	Local Security Authority

MEMFS	Memory File System
MIB	Management Information Base
MIDL	Microsoft Interface Definition Language
MS	Microsoft
MS-DOS	Microsoft Disk Operating System
NB	NetBIOS
NBNS	NetBIOS Name Server
NetBIOS	Network Basic Input Output System
NetBT	NetBIOS over TCP/IP
NFS	Network File System
NTFS	NT File System
OS/2	Operating System /2
OSI	Open Systems Interconnection
PC	Personal Computer
PCL	Printer Control Language
PDC	Primary Domain Controller
PDF	Portable Document Format
PPP	Point-to-Point Protocol
PST	Pacific Standard Time
RAS	Remote Access Service
RFC	Request for Comment
RISC	Reduced Instruction Set Computer
RMS	Reliant Monitor Software
RPC	Remote Procedure Call
SAM	Security Accounts Manager
SAX	Software Administration UNIX
SID	Security Identifier
SLIP	Serial Line IP
SNMP	Simple Network Management Protocol
SMB	Server Message Block
SSI	Single System Image
TCP/IP	Transmission Transport Protocol/Internet Protocol
TLI	Transport Layer Interface

TSR	Terminate and Stay Resident
UDP	User Datagram Protocol
UFS	UNIX File System
UID	User ID
UNC	Uniform Naming Convention
UPS	Uninterruptable Power Supply
VxFS	Veritas File System
WINS	Windows Internet Name Service
WAN	Wide Area Network
WfW	Windows for Workgroups

Related publications

Advanced Server for UNIX V4.0
Concepts and Planning

Target group
System and network administrators
Contents
Introduction to Advanced Server for UNIX. Information on the administration and security concept, domains and trusts administration of shared network files, printing, monitoring network activities, and differences to LAN Manager/X is included.
Changes and extensions to the Siemens version are documented in this manual, "Overview and Installation".

Advanced Server for UNIX V4.0
API Reference

Target group
Developers
Contents
Brief overview of the API functions. Detailed information is provided in the API manual pages.

LAN Manager/X V2.2
SNMP Service

Target group
System administrators
Contents
Incorporation of SNMP Service.

The following manuals relate to the MS-DOS and MS OS/2 workstations:

MS Network Client V2.2
Installation Guide for Clients

Target group
System administrators
Contents
Installation and configuration information for client software, information on incorporating the network driver, and information on the *lanman.ini* file on client systems.

MS Network Client V2.2
User's Guide for MS-DOS Clients

Target group
Users
Contents
Operating instructions for starting and stopping client software, notes on using shared resources, operating instructions for the Messenger service, command reference for network and other client commands, notes on setting up shared client printers, notes on operating with NetWare Connectivity, and troubleshooting.

MS Network Client V3.0
Installation Guide for Clients

Target group
Users
Contents
Additional installation and configuration information for client software, and troubleshooting.

MS Network Client V2.2
User's Guide for MS Windows Clients

Target group
Users
Contents
Operating instructions for starting and stopping client software, notes on using shared resources, operating instructions for the Messenger service, command reference for Net and other client commands, notes on setting up shared client printers, notes on operating with NetWare Connectivity, and troubleshooting.

MS Network Client V2.2
NetWare Connectivity

Target group
System administrators
Contents
The basics of "NetWare Connectivity", installing and configuring NetWare Connectivity, troubleshooting, and differences in the administration of NetWare, Windows NT, and LAN Manager.

Other Siemens publications:

SINIX V5.43
Network Administration

System Administrator's Guide

SINIX V5.43
Tuning Guide

System Administrator's Guide

SINIX V5.43
System Administration and Hardware Configuration Using SYSADM

System Administrator's Guide

SINIX V5.43
Commands – Volume 1 and 2

Reference Manuals

SINIX V5.43
Systemadministrator

System Administrator's Guide

SINIX
AT&T Spooler

System Administrator's Guide

SINIX
SPOOL V4.2

User and Administrator Guide

SINIX
SPOOL V4.2

Reference Manual

SINIX
SPOOL V4.2

Menus

User's Guide

Xprint
User and Administrator Guide

Xprint
Reference Manual

Xprint
Menus

User's Guide

SINIX
OBSERVE

User Guide

SINIX V5.41
Logging V3.0

Target group: System administrators and programmers

Ordering manuals

You can order the specified publication through your local Siemens office.

Index

Comments
Suggestions
Corrections

Submitted by

Comments on   Advanced Server UNIX V4.0
              Overview and Installation

Siemens Business Services
Training and Services, Consulting Service
81730 Munich
Germany

Fax: (++49) 89 636-52003

The Siemens Training Center offers consulting for in-service training, courses and self-tuition media on almost all aspects of information technology, either on your premises or at a Training Center near you. Write to us for information and course programs.

Submitted by

Please send me information/course programs on the following topics

---

U7613-J-Z815-6-76